73® Amateur Radio Today

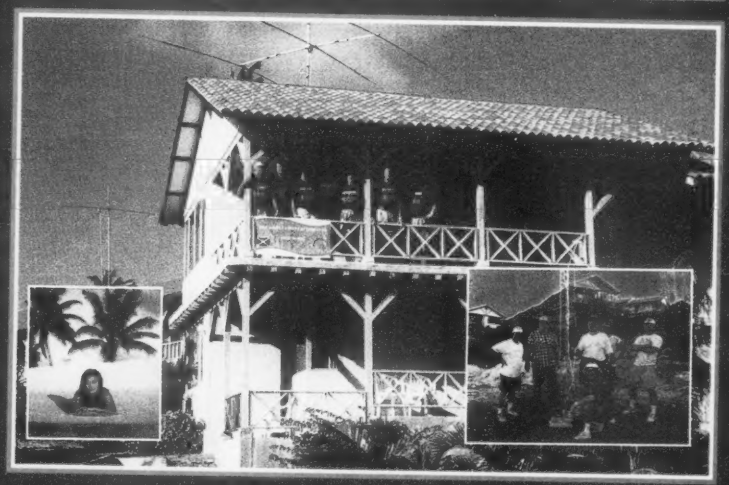
NOVEMBER 1999
ISSUE #469
USA $3.95
CANADA $4.95

Adventure Blueprint: Planning Your Own DXpedition

All-Band Steerable Horizontal Loop

Easy-Build Transceiver Tester

More History of Ham Radio



DXing and you — page 14

**********5-DIGIT 48103
#000001919811WR9# JUN76
UNIV MICROFILM
SERIAL PRCNG ATTNL
300 N ZEEB RD
ANN ARBOR MI 48103-1553

SYNTHESIZED VHF & UHF EXCITER & RECEIVER MODULES

Exciters and Receivers provide high quality nbfm and fsk operation. Features include:

- ***Dip switch frequency selection.***
- ***Exceptional modulation for voice and ctcss.***
- ***Very low noise synthesizer for repeater service.***
- ***Direct fm for data up to 9600 baud.***
- ***TCXO for tight frequency accuracy in wide range of environmental conditions.***
- ***Next day shipping. No wait for crystals.***

EXCITERS:

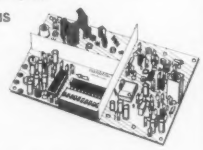
Rated for continuous duty, 2-3W output.

T301 VHF Exciter: for various bands 139-174MHz, 216-226 MHz.

- Kit (ham bands only) ...**$109** (TCXO option $40)
- Wired/tested, incl TCXO...**$189**

T304 UHF Exciter: various bands 400-470 MHz.

- Kit (440-450 ham band only) incl TCXO ...**$149**
- Wired/tested...**$189**



RECEIVERS:

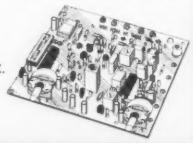
***Very sensitive** – 0.2µV.*
***Superb selectivity,** >100 dB down at ±12 kHz, best available anywhere, flutter-proof squelch.*

R301 VHF Receiver: various bands 139-174MHz, 216-226 MHz.

- **Kit** (ham bands only) ...**only $139** (TCXO option $40)
- **Wired/tested** ...**$209** (includes TCXO)

R304 UHF Receiver: various bands 400-470MHz.

- Kit (440-450 ham band only) incl TCXO ...**$179**
- Wired/tested...**$209**



TRADITIONAL CRYSTAL-CONTROLLED VHF & UHF FM EXCITERS & RECEIVERS

FM EXCITERS: 2W output, continuous duty.

- **TA51:** for 6M, 2M, 220 MHz ..... **kit $99, w/t $169**
- **TA451:** for 420-475 MHz. ..... **kit $99, w/t $169**
- **TA901:** for 902-928 MHz, (0.5W out) ..... **w/t $169**

VHF & UHF POWER AMPLIFIERS.

Output levels from 10W to 100W..... **Starting at $99**

FM RECEIVERS:

- **R100 VHF FM RCVR.** For 46-54, 72-76, 140-175, or 216-225 MHz. ..... **kit $129, w/t $189**
- **R144 RCVR.** Like R100, for 2M, with helical resonator in front end..... **kit $159, w/t $219**
- **R451 FM RCVR,** for 420-475 MHz. Similar to R100 above. kit $129, w/t $189.
- **R901 FM RCVR,** 902-928MHz ..... **$159, w/t $219**

TRANSMITTING & RECEIVING CONVERTERS

No need to spend thousands on new transceivers for each band!

- **Convert vhf and uhf signals to & from 10M.**
- Even if you don't have a 10M rig, you can pick up very good used xmtrs & rcvrs for next to nothing.
- Receiving converters (shown above) available for various segments of 6M, 2M, 220, and 432 MHz.
- Rcvg Conv Kits from $49, wired/tested units only $99.

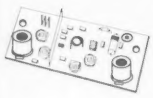
- **Transmitting converters for 2M, 432 MHz.**
- Kits only $89 vhf or $99 uhf.
- Power amplifiers up to 50W.

LOW NOISE RECEIVER PREAMPS

NEW

LNY-( ) ECONOMY PREAMP

ONLY $29/w&t

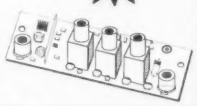


- Miniature MOSFET Preamp.
- Low noise figure.
- RCA jacks allow easy connection inside radios.
- *Available* for various bands from 28 to 450 MHz.

LNP-( ) PRESELECTOR

NEW

ONLY $39/w&t



- Eliminate intermod!
- Low noise preamp
- Sharp 3-section filter
- Available for bands from 137 to 170 MHz.

LNG-( ) GaAs FET PREAMP

STILL ONLY $59, wired/tested

- Make your friends sick with envy! Work stations they don't even know are there.
- Install one at the antenna and overcome coax losses.
- *Available for 28-30, 46-56, 137-152, 152-172, 210-230, 400-470, and 800-960 MHz bands.*

SUBAUDIBLE TONE ENCODER/DECODER

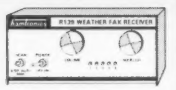
Access all your favorite closed repeaters!

- **Encodes** all standard CTCSS tones with crystal accuracy and convenient DIP switch selection.
- **Decoder** can be used to mute receive audio and is optimized for installation in repeaters to provide closed access. High pass filter gets rid of annoying rcvr buzz.

- **TD-5** CTCSS Encoder/Decoder Kit ..... now only **$29**
- **TD-5** CTCSS Encoder/Decoder Wired/tested..... **$49**

WEATHER FAX RECEIVER

Join the fun. Get striking images directly from the weather satellites!



A very sensitive wideband fm receiver **optimized for NOAA** APT & Russian Meteor **weather fax** on the 137MHz band.

Covers all 5 satellite channels. Scanner circuit & recorder control allow you to automatically capture signals as satellites pass overhead, even while away from home.

See product review with actual satellite pictures in June 1999 QST, along with info on software and antennas.

- **R139 Receiver Kit** less case **$159**
- **R139 Receiver Kit** with case and AC power adapter **$189**
- **R139 Receiver w/t** in case with AC power adapter ...**$239**
- Internal PC Demodulator Board & Imaging Software **$289**
- Turnstile Antenna **$119**
- Weather Satellite Handbook **$20**

WWV RECEIVER

Get time & frequency checks without buying multiband hf rcvr. Hear solar activity reports affecting radio propagation.

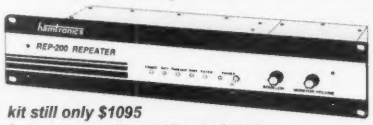
Very sensitive and selective crystal controlled superhet, dedicated to listening to WWV on 10 MHz. Performance rivals the most expensive rcvrs.

- **RWWV Rcvr** kit, PCB only **$59**
- **RWWV Rcvr** kit with cabt, spkr, & 12Vdc adapter **$89**
- **RWWV Rcvr** w/t in cabt with spkr & adapter **$129**

Get more features for your dollar with our

REP-200 REPEATER

A microprocessor-controlled repeater with full autopatch and many versatile dtmf remote control features at less than you might pay for a bare bones repeater or controller alone!



- ***kit still only $1095***
- ***factory assembled still only $1295***

50-54, 143-174, 213-233, 420-475 MHz. (902-928 MHz slightly higher.)

☛ **FCC type accepted** for commercial service in 150 & 450 MHz bands.

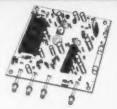
Digital Voice Recorder Option. Allows message up to 20 sec. to be remotely recorded off the air. Play back at user request by DTMF command, or as a periodical voice id, or both. **Great for making club announcements!** ..... **only $100.**

REP-200C Economy Repeater. Real-voice ID, no dtmf or autopatch. ..... Kit only $795, w&t $1195.

REP-200N Repeater. Without controller so you can use your own. ..... **Kit only $695, w&t $995.**

You'll KICK Yourself If You Build a Repeater Without Checking Out Our Catalog First!

Hamtronics has the world's most complete line of modules for making repeaters. In addition to exciters, pa's, and receivers, we offer the following controllers.



COR-3. Inexpensive, flexible COR module with timers, courtesy beep, audio mixer. ..... **only $49/kit, $79 w/t.**

CWID. Traditional diode matrix ID'er. ..... **kit only $59.**

CWID-2. Eprom-controlled ID'er..... **only $54/kit, $79 w/t.**

DVR-1. Record your own voice up to 20 sec. For voice id or playing club announcements. ..... **$59/kit, $99 w/t.**

COR-4. Complete COR and CWID all on one board. ID in eprom. Low power CMOS. ..... **only $99/kit, $149 w/t.**

COR-6. COR with real-voice id. Low power CMOS, non-volatile memory. ..... **kit only $99, w/t only $149.**

COR-5. µP controller with autopatch, reverse ap, phone remote control, lots of DTMF control functions, all on one board, as used in REP-200 Repeater. ..... **$379 w/t.**

AP-3. Repeater autopatch, reverse autopatch, phone line remote control. Use with TD-2. ..... **kit $89.**

TD-2. Four-digit DTMF decoder/controller. Five latching on-off functions, toll call restrictor. ..... **kit $79.**

TD-4. DTMF controller as above except one on-off function and no toll call restrictor. Can also use for selective calling; mute speaker until someone pages you. ..... **kit $49.**

WEATHER ALERT RECEIVER

A sensitive and selective professional grade receiver to monitor critical NOAA weather broadcasts. Good reception even at distances of 70 miles or more with suitable antenna. No comparison with ordinary consumer radios!

Automatic mode provides storm watch, alerting you by unmuting receiver and providing an output to trip remote equipment when an alert tone is broadcast. Crystal controlled for accuracy; **all 7 channels** (162.40 to 162.55).

Buy just the receiver pcb module in kit form or buy the kit with an attractive metal cabinet, AC power adapter, and built-in speaker. Also available factory wired and tested.

RWX Rcvr kit, PCB only **$79**
RWX Rcvr kit with cabinet, speaker, & AC adapter **$99**
RWX Rcvr wired/tested in cabinet with speaker & adapter **$139**

Buy at low, factory-direct net prices and save!
For complete info, call or write for complete catalog.
Order by mail, fax, email, or phone (9-12, 1-5 eastern time).
Min. $6 S&H charge for 1# lb. plus add'l weight & insurance.
Use Visa, MC, Discover, check, or UPS C.O.D.

See SPECIAL OFFERS and view complete catalog on our web site:
www.hamtronics.com
email: jv@hamtronics.com

Our 38th Year

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65-D Moul Rd; Hilton NY 14468-9535
Phone 716-392-9430

ASTRON CORPORATION 9 Autry Irvine, CA 92618
(949) 458-7277 • (949) 458-0826

E151765 E151765

...POWER ON WITH ASTRON

SWITCHING POWER SUPPLIES...

MODEL SS-10TK

MODEL SS-12IF

SPECIAL FEATURES:

- HIGH EFFICIENCY SWITCHING TECHNOLOGY SPECIFICALLY FILTERED FOR USE WITH COMMUNICATIONS EQUIPMENT, FOR ALL FREQUENCIES INCLUDING HF
- HEAVY DUTY DESIGN
- LOW PROFILE, LIGHT WEIGHT PACKAGE
- EMI FILTER
- MEETS FCC CLASS B

PROTECTION FEATURES:

- CURRENT LIMITING
- OVERVOLTAGE PROTECTION
- FUSE PROTECTION.
- OVER TEMPERATURE SHUTDOWN

SPECIFICATIONS:

INPUT VOLTAGE: 115 VAC 50/60HZ
OR 220 VAC 50/60HZ
SWITCH SELECTABLE

OUTPUT VOLTAGE: 13.8VDC

AVAILABLE WITH THE FOLLOWING APPROVALS: UL, CUL, CE, TUV.

MODEL SS-18

DESKTOP SWITCHING POWER SUPPLIES

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SS-10	7	10	1⅛ x 6 x 9	3.2
SS-12	10	12	1⅜ x 6 x 9	3.4
SS-18	15	18	1⅜ x 6 x 9	3.6
SS-25	20	25	2⅞ x 7 x 9⅝	4.2
SS-30	25	30	3¾ x 7 x 9⅝	5.0

MODEL SS-25M

DESKTOP SWITCHING POWER SUPPLIES WITH VOLT AND AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SS-25M*	20	25	2⅞ x 7 x 9⅝	4.2
SS-30M*	25	30	3¾ x 7 x 9⅝	5.0

MODEL SRM-30

RACKMOUNT SWITCHING POWER SUPPLIES

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25	20	25	3½ x 19 x 9⅝	6.5
SRM-30	25	30	3½ x 19 x 9⅝	7.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M	20	25	3½ x 19 x 9⅝	6.5
SRM-30M	25	30	3½ x 19 x 9⅝	7.0

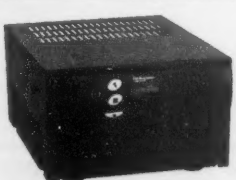
MODEL SRM-30M-2

2 ea SWITCHING POWER SUPPLIES ON ONE RACK PANEL

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25-2	20	25	3½ x 19 x 9⅝	10.5
SRM-30-2	25	30	3½ x 19 x 9⅝	11.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M-2	20	25	3½ x 19 x 9⅝	10.5
SRM-30M-2	25	30	3½ x 19 x 9⅝	11.0



MODEL SS-12SM/GTX

MODEL SS-10EFJ-98

CUSTOM POWER SUPPLIES FOR RADIOS BELOW

EF JOHNSON AVENGER GX-MC41
EF JOHNSON AVENGER GX-MC42
EF JOHNSON GT-ML81
EF JOHNSON GT-ML83
EF JOHNSON 9800 SERIES
GE MARC SERIES
GE MONOGRAM SERIES & MAXON SM-4000 SERIES
ICOM IC-F11020 & IC-F2020
KENWOOD TK760, 762, 840, 860, 940, 941
KENWOOD TK760H, 762H
MOTOROLA LOW POWER SM50, SM120, & GTX
MOTOROLA HIGH POWER SM50, SM120, & GTX
MOTOROLA RADIUS & GM 300
MOTOROLA RADIUS & GM 300
MOTOROLA RADIUS & GM 300
UNIDEN SMH1525, SMU4525
VERTEX — FTL-1011, FT-1011, FT-2011, FT-7011

NEW SWITCHING MODELS

SS-10GX, SS-12GX
SS-18GX
SS-12EFJ
SS-18EFJ
SS-10-EFJ-98, SS-12-EFJ-98, SS-18-EFJ-98
SS-12MC
SS-10MG, SS-12MG
SS-101F, SS-121F
SS-10TK
SS-12TK OR SS-18TK
SS-10SM/GTX
SS-10SM/GTX, SS-12SM/GTX, SS-18SM/GTX
SS-10RA
SS-12RA
SS-18RA
SS-10SMU, SS-12SMU, SS-18SMU
SS-10V, SS-12V, SS-18V

*ICS – Intermittent Communication Service

MFJ *Switching* Power Supplies

Power your HF transceiver, 2 meter/440 MHz mobile/base and accessories with these new 25 or 45 Amp MFJ MightyLite™ Switching Power Supplies! No RF hash . . . Super lightweight . . . Super small . . . Volt/Amp Meters . . .

MFJ's new adjustable voltage switching power supplies do it all! Power your HF or 2M/440 MHz radio and accessories.

MFJ's *MightyLites*™ are so light and small you can carry them in the palm of your hand! Take them with you anywhere.

No more picking up and hauling around heavy, bulky supplies that can give you a painful backache, pulled muscle or hernia.

MFJ's 25 Amp *MightyLite*™ weighs just 3.7 lbs. -- that's *5 times lighter* than an equivalent conventional power supply. MFJ's 45 Amp is even more dramatic -- *8 times lighter* and weighs just 5.5 pounds!

No RF hash!

These babies are clean . . . Your buddies won't hear *any* RF hash on your signal! *None* in your receiver either!

Some competing switching power supplies generate objectionable RF hash in your transmitted and received signal.

These super clean MFJ *MightyLites*™ meet all FCC Class B regulations.

Low Ripple . . . Highly Regulated

Less than 35 mV peak-to-peak ripple under 25 or 45 amp full load. Load regulation is better than 1.5% under full load.

Fully Protected

You won't burn up our power supplies!

No RF Hash!

← MFJ-4225MV
25 Amp
$149.95
plus s&h

MFJ-4245MV →
45 Amp
$199.95
plus s&h

No RF Hash!

They are fully protected with Over Voltage and Over Current protection circuits.

Worldwide Versatility

MFJ *MightyLites*™ can be used anywhere in the world! They have switchable AC input voltage and work from 85 to 135 VAC or 170 to 260 VAC. Replaceable fuse.

MightyLites™ . . . Mighty Features

Front-panel control lets you vary output from 9 to 15 Volts DC.

Front-panel has easy access five-way binding posts for heavy duty use and cigarette lighter socket for mobile accessories. MFJ-4245MV has two sets of quick-connects on the rear for accessories.

Brightly illuminated 3 inch meters let you monitor load voltage and current.

A whisper quiet internal fan efficiently cools your power supply for long life.

Two models to choose from . . .

MFJ-4225MV, $149.95. 25 Amps maximum or 22 Amps continuous. Weighs 3.7 pounds. Measures 5¾Wx4½Hx6D in.

MFJ-4245MV, $199.95. 45 Amps maximum or 40 Amps continuous. Weighs 5.5 pounds. Measures 7½Wx4¾Hx9D in.

***NEW!* 25 Amp *MightyLite*™**

Super light, super compact switching power supply delivers 25 Amps maximum/22 Amps continuous at 13.8 Volts DC. Low ripple, highly regulated. ***No RF Hash!*** Five-way binding posts for high current. Quick connects for accessories. Over voltage/current protection. 110 or 220 VAC operation. Meets FCC Class B regs. 3.5 lbs. 5½Wx2½Hx10¾D in.

MFJ-4125
25 Amp
$109.95
plus s&h

MFJ 35/30 Amp Adjustable Regulated DC Power Supply

Massive 19.2 pound transformer . . . No RF hash . . . Adjustable 1 to 14 VDC . . .

MFJ-4035MV
$149.95
plus s&h

MFJ's heavy duty conventional power supply is excellent for powering HF or 2 Meter/440 MHz transceiver/accessories.

A massive 19.2 pound transformer makes this power supply super heavy duty! It delivers 35 amps maximum and 30 amps continuous without even flexing its muscles. Plugs into any 110 VAC wall outlet.

It's highly regulated with load regulation better than 1%. Ripple voltage is less than 30 mV. *No RF hash* -- it's super clean!

Fully protected -- has over voltage protection, fold back short circuit protection and over-temperature protection.

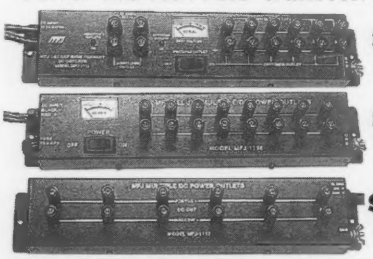
You get front panel adjustable voltage from 1 to 14 VDC with a convenient detent set at 13.8 VDC. A pair of front-panel meters let you monitor voltage and current.

Three sets of output terminals include a pair of heavy duty five-way binding posts for HF/VHF radios, two pairs of quick-connects for accessories and a covered cigarette lighter socket for mobile accessories.

A front-panel fuse holder makes fuse replacement easy. Whisper quiet fan speed increases as load current increases -- keeps components cool. 9½Wx6Hx9¾D inches.

MFJ *High Current* Multiple DC Power Outlets

Power two HF/VHF transceivers and six or more accessories from your 12 VDC power supply



MFJ-1118
$74.95
plus s&h

MFJ-1116
$49.95
plus s&h

MFJ-1112
$34.95
plus s&h

New!
MFJ-1117
$44.95
plus s&h

MFJ-1118, $74.95. This is MFJ's most versatile and highest current *Deluxe Multiple DC Power Outlet*. Lets you power two HF and/or VHF transceivers and six or more accessories from your transceiver's main 12 VDC supply.

Two pairs of super heavy duty 30 amp 5-way binding posts connect your transceivers. Each pair is fused and RF bypassed. Handles 35 Amps total.Six pairs of heavy duty, RF bypassed 5-way binding posts let you power your accessories. They handle 15 Amps total, are protected by a master fuse and have an ON/OFF switch with "ON" LED indicator.

Built-in 0-25 VDC voltmeter. Six feet super heavy duty eight gauge color-coded cable with ring tongue terminals. Binding posts are spaced for standard dual banana plugs. Heavy duty aluminum construction. 12½x2¾x2½ in.

MFJ-1116, $49.95. Similar to MFJ-1118. No 30 amp posts. Has "ON" LED and 0-25 VDC voltmeter. 15 amps total.

MFJ-1112, $34.95. Similar to MFJ-1116. No on/off switch, LED, meter, fuse.

NEW! MFJ-1117, $54.95. For powering four HF /VHF radios (two at 35 Amps each and two at 35 Amps combined) simultaneously. Tiny 8x2x3 inches.

Free MFJ Catalog
and Nearest Dealer . . . 800-647-1800
http://www.mfjenterprises.com

• 1 Year *No Matter What*™ warranty • 30 day money back guarantee (less s/h) on orders direct from MFJ

MFJ ENTERPRISES, INC.
Box 494, Miss. State, MS 39762
(662) 323-5869; 8-4:30 CST, Mon.-Fri.
FAX: (662) 323-6551; **Add s/h**
Tech Help: (662) 323-0549

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All are protected by MFJ's famous No Matter What™ one year limited warranty.

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TABLE OF CONTENTS

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FEATURES

10 **Need a UHF Dipper? — W6WTU**
Part 2: Coupling to an outside environment.

14 **Planning a DXpedition — W4DC**
Here's what to do if you take Wayne's advice ...

18 **Why Not β-Morse? — VE2MHZ**
An amusing way to preserve your Morse code.

19 **Building a Better Collins — W2CQM**
Add this $1 solid state replacement part to your 30S1.

24 **Isotron Notes — AD1B**
Simple tips straight from the Hart.

26 **Basic Transceiver Tester — WB9YBM**
This fancy spin on some common components is a good beginner's project.

28 **Your Batteries Ready for Y2K? — N7MGT**
Electrifying tidbits even you old-timers don't know.

35 **No Bum Steer — W6US**
Maximize your loop's performance the easy way.

37 **Secrets of Transmission Lines — KE2QJ**
Part 4: Traveling waves and some thought experiments.

41 **The History of Ham Radio — W9CI**
Part 3: 1920–21.

REVIEW

32 **A Big Look at Small Wonders' WM-20 — AC4HF**
This SSB transceiver kit is fun to build and works well.

DEPARTMENTS

WB6IGP 46 Above & Beyond
49 Ad Index
64 Barter 'n' Buy
55 Calendar
NØUR 60 Cartoon
KB7NO 52 The Digital Port
6 Letters
W2NSD/1 4 Never Say Die
48 New Products
KE8YN/4 50 On the Go
W1XU/7 60 Propagation
WB8VGE 51 QRP
8 QRX
63 Radio Bookshop
6 Updates

Contest Winners
Page 62

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On the cover: DXing and you meet up on page 14. We are always looking for interesting articles and cover photos — with or without each other. Your photo could be mentioned in this space *next* month, and our check could be on its way to *you!* You couldn't use a little extra cash?

Feedback: Any circuit works better with feedback, so please take the time to report on how much you like, hate, or don't care one way or the other about the articles and columns in this issue. G = great!, O = okay, and U = ugh. The G's and O's will be continued. Enough U's and it's Silent Keysville. Hey, this is *your* communications medium, so don't just sit there scratching your...er...head. FYI: Feedback "number" is usually the page number on which the article or column starts.

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Contract: By being so nosey as to read this fine print, you have just entered into a binding agreement with *73 Amateur Radio Today*. You are hereby obligated to do something nice for a ham friend—buy him a subscription to *73*. What? All of your ham friends are already subscribers? Donate a subscription to your local school library!

NEVER SAY DIE

Wayne Green W2NSD/1
w2nsd@aol.com

Anniversary

I got a note from Dave Sumner K1ZZ, complete with a commemorative 60-year ARRL membership pin to wear on my hamfest hat. Now, if I can hold to my new diet and keep my body in good shape, and if amateur radio and the League are still around in 2009, I'll have a 70-year pin for my hat. Plus a commemorative plaque for my shack wall. Dave was kind enough to drive up to deliver my 60-year plaque in person!

It's kind of nice being a living link with the past. I was there in the "good old days," so I can explain to newcomers what things were really like 60 years ago — back in the pre-WWII days. Well, the war actually got started in Europe on my birthday, September 3, 1938, when I was 16 and having a ball on 40 CW. Yeah, I really did make CW contacts. Then I discovered phone and had even more fun on 160 and 2-1/2 meter phone. Then came Pearl Harbor and my enlisting in the Navy as an electronic technician for four years, complete with service on the USS *Drum* (now on display in Mobile AL) from 1943–45. I was on the air the day we were closed down for the war, and back on the day they opened the 2-1/2 meter band in December 1945, four years later. And I've been on the air having fun ever since.

The Odds

A little item in *Time* caught my eye. Well, it mentioned cancer and nursing homes. It seems that a recent study showed that 40% of the cancer patients in nursing homes get too little or no pain medication. Not even aspirin! I don't know if you've had a family member who died of cancer, but when I lived in Brooklyn the guy across the street did and his screams of pain could be heard day and night until he finally died.

This is, of course, of little importance to you if you are not ever going to (a) live in a nursing home and (b) get cancer. Well, unless you change your lifestyle significantly, your odds are not good. Around 60% of our elderly are ending their days in nursing homes, where there is nothing to do and the food sucks. Add to that the 40% who will get cancer (heading toward 50% as we continue to smoke and sugar ourselves to early deaths), and you are playing against serious odds.

How come all the pain? Well, two things. First, there's the cost of drugs, and second, the medical police and the drug enforcement people are out there looking for any doctor who's been prescribing painkillers. Several have lost their licenses just through prescribing painkilling drugs for terminal cancer patients.

Both cancer and a nursing home are avoidable if you stop doing bad things to your body. Oh, to hell with the fat, the nursing homes, and the incredible pain of cancer, pass me another doughnut. Right?

The Other Shoe

Since the Kenneth Starr investigation started with Whitewater, even a not very perceptive person might wonder how come the released Starr report didn't mention this. This will, I suspect, be the other shoe to drop. Between the leaks and White House spinmeisters, anyone can be forgiven for being confused about the Whitewater mess. Maybe I can clarify it for you.

This all started back in Arkansas, where the Clintons were partners with Jim and Susan McDougal in the Whitewater Development Corporation. The accounts were kept in the Madison Guarantee Savings & Loan, run by Jim McDougal, with Hillary Clinton as an attorney. When Federal bank examiners checked Madison, they testified that it was a "corrupt institution that routed millions of dollars to politically connected Arkansans." The report cited wire fraud, illegal campaign contributions, embezzlement, money laundering, falsification of loan records and board minutes, etc. The FDIC had to cover over $60 million that was looted.

Part of the money stolen by McDougal and Hillary went right into Bill Clinton's campaign account.

The reason a special prosecutor had to be called in was the obstruction of investigations at both the state and federal levels by the Clintons, the same pattern we've seen repeated with Bill's sex scandals.

I Don't Believe ...

Several readers recommended I read Mally Cox-Chapman's *The Case For Heaven — Near Death Experiences as Evidence of the Afterlife* (Putnam's Sons, 1995, ISBN 0-399-14024-7, 203pp., $20). Mally has interviewed hundreds of people about their near-death visit to heaven, and the stories they tell have a compelling similarity. Other than being more expensive and a little slow going, the stories are not much different from those in a number of other "light" books I've read.

Yes, I also read *The Skeptical Inquirer*, which steadfastly refuses to accept the paranormal, reincarnation, past lives, spoon bending, psi, clairvoyance, psychokinesis, UFOs, contactees, Roswell, cold fusion, and so on. I have no problem with skepticism, as long as it isn't pathological. Well, the *Inquirer* has its "I don't believe" shtick, which is just as much a belief as in UFOs or any of the organized commercial religions.

While I don't approach anomalies as a skeptic, I am not an easy convert. I want to see convincing evidence. And as I read well-researched books and talk with people who have obviously done their homework, I tend to give credence to their views.

Naturally, skeptics believe that spoon bending is bunk. But only if the skeptic hasn't done much research. One of the books in my wisdom guide is Michael Creighton's *Travels*. It's a fascinating book. Nonfiction. He tells about his years in medical school. He also tells about his skeptical approach to auras and spoon bending, and his amazing experiences. It's a pocket book, so don't be so chintzy. Read it and then tell me he's full of baloney. Dare.

Are you going through life with "I don't believe ..." blinders on?

Once I have managed to pry your blinders open a tad, maybe I can get you to start reading about the mysteries of water, magnetism, and a host of other anomalies that are mis- or at least poorly understood. I'm in way over my head trying to learn about so many things. I need your help.

Continued on page 6

RAMSEY Cool Wireless Goodies

World's Smallest TV Transmitters

We call them the 'Cubes'.... Perfect video transmission from a transmitter you can hide under a quarter and only as thick as a stack of four pennies - that's a nickel in the picture! Transmits color or B&W with fantastic quality - almost like a direct wired connection to any TV tuned to cable channel 59. Crystal controlled for no frequency drift with performance that equals law enforcement models that cost hundreds more! Basic 20 mW model transmits up to 300' while the high power 100 mW unit goes up to 1/4 mile. Audio units include sound using a sensitive built-in mike that will hear a whisper 15 feet away! Units run on 9 volts and hook-up to most any CCD camera. Any of our cameras have been tested to mate perfectly with our Cubes and work great. Fully assembled - just hook-up power and you're on the air! These are the units that are being built into hats, pagers, cigarette packs and sold for big $$!!

C-2000, Basic Video Transmitter.....$89.95
C-2001, High Power Video Transmitter...$179.95
C-3000, Basic Video & Audio Transmitter.....$149.95
C-3001, High Power Video & Audio Transmitter....$229.95

Doppler Direction Finder

Track down jammers and hidden transmitters with ease! This is the famous WA2EBY DF'er featured in April 99 QST. Shows direct bearing to transmitter on compass style LED display, easy to hook up to any FM receiver. The transmitter - the object of your DF'ing - need not be FM, it can be AM, FM or CW. Easily connects to receiver's speaker jack and antenna, unit runs on 12 VDC. We even include 4 handy home-brew "mag mount" antennas and cable for quick set up and operation! Whips can be cut and optimized for any frequency from 130-1000 MHz. Track down that jammer, win that fox hunt, zero in on that downed Cessna - this is an easy to build, reliable kit that compares most favorably to commercial units costing upwards of $1000.00! This is a neat kit!!

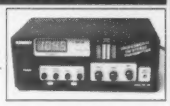
DDF-1, Doppler Direction Finder Kit $149.95

CCD Video Cameras

Top quality Japanese Class 'A' CCD array, over 440 line line resolution, not the off-spec arrays that are found on many other cameras. Don't be fooled by the cheap CMOS single chip cameras which have 1/2 the resolution, 1/4 the light sensitivity and draw over twice the current! The black & white models are also super IR (Infra-Red) sensitive. Add our invisible to the eye, IR-1 illuminator kit to see in the dark! Color camera has Auto gain, white balance, Back Light Compensation and DSP! Available with Wide-angle (80º) or super slim Pin-hole style lens. Run on 9 VDC, standard 1 volt p-p video. Use our transmitters for wireless transmission to TV set, or add our IB-1 Interface board kit for audio sound pick-up and super easy direct wire hook-up to any Video monitor, VCR or TV with A/V input. Fully assembled, with pre-wired connector.

CCDWA-2, B&W CCD Camera, wide-angle lens $69.95
CCDPH-2, B&W CCD Camera, slim fit pin-hole lens..... $69.95
CCDCC-1, Color CCD Camera, wide-angle lens $129.95
IR-1, IR Illuminator Kit for B&W cameras $24.95
IB-1, Interface Board Kit. $14.95

Super Pro FM Stereo Transmitter



Professional synthesized FM Stereo station in easy to use, handsome cabinet. Most radio stations require a whole equipment rack to hold all the features we've packed into the FM-100. Set freq with Up/Down buttons, big LED display. Input low pass filter gives great sound (no more squeals or swishing from cheap CD inputs!) Limiters for max 'punch' in audio - without over mod, LED meters to easily set audio levels, built-in mixer with mike, line level inputs. Churches, drive-ins, schools, colleges find the FM-100 the answer to their transmitting needs, you will too. Great features, great price! Kit includes cabinet, whip antenna, 120 VAC supply. *We also offer a high power export version of the FM-100 that's fully assembled with one watt of RF power, for miles of program coverage. The export version can only be shipped outside the USA, or within the US if accompanied by a signed statement that the unit will be exported.*

FM-100, Pro FM Stereo Transmitter Kit $249.95
FM-100WT, Fully Wired High Power FM-100..... $399.95

FM Stereo Radio Transmitters

No drift, microprocessor synthesized! Excellent audio quality, connect to CD player, tape deck or mike mixer and you're on-the-air. Strapable for high or low power! Runs on 12 VDC or 120 VAC. Kit includes case, whip antenna, 120 VAC power adapter - easy one evening assembly.

FM-25, Synthesized Stereo Transmitter Kit $129.95

Lower cost alternative to our high performance transmitters. Great value, easily tunable, fun to build. Manual goes into great detail about antennas, range and FCC rules. Handy kit for sending music thru house and yard, ideal for school projects too - you'll be amazed at the exceptional audio quality! Runs on 9V battery or 5 to 15 VDC. Add our matching case and whip antenna set for nice 'pro' look.

FM-10A, Tunable FM Stereo Transmitter Kit. $34.95
CFM, Matching Case and Antenna Set $14.95
FMAC, 12 Volt DC Wall Plug Adapter..... $9.95

Mini Radio Receivers

Imagine the fun of tuning into aircraft a hundred miles away, the local police/fire department, ham operators, or how about Radio Moscow or the BBC in London? Now imagine doing this on a little radio you built yourself - in just an evening! These popular little receivers are the nuts for catching all the action on the local ham, aircraft, standard FM broadcast radio, shortwave or WWV National Time Standard radio bands. Pick the receiver of your choice, each easy to build, sensitive receiver has plenty of crystal clear audio to drive any speaker or earphone. Easy one evening assembly, run on 9 volt battery, all have squelch except for shortwave and FM broadcast which has handy SCA output. Add our snazzy matching case and knob set for that smart finished look.

AR-1, Airband 108-136 MHz Kit $29.95
HFRC-1, WWV 10 MHz (crystal controlled) Kit $34.95
FR-1, FM Broadcast Band 88-108 MHz Kit. $24.95
FR-6, 6 Meter FM Ham Band Kit $34.95
FR-10, 10 Meter FM Ham Band Kit. $34.95
FR-146, 2 Meter FM Ham Band Kit. $34.95
FR-220, 220 MHz FM Ham Band Kit. $34.95
SR-1, Shortwave 4-11 MHz Band Kit $29.95
Matching Case Set (specify for which kit) $14.95

Tiny Transmitters

Gosh, these babies are tiny - that's a quarter in the picture! Choose the unit that's best for you. FM-5 is the smallest tunable FM transmitter in the world, picks up a whisper 10' away and transmits up to 300'. Runs on tiny included watch battery, uses SMT parts. FM-4 is larger, more powerful, runs on 5-12 volts, goes up to a mile. FM4,5 operate in standard FM band 88-108 MHz. FM-6 is crystal controlled in 2 meter ham band, 146.535 MHz, easily picked up on scanner or 2 meter rig, runs on 2 included watch batteries. SMT (surface mount) kits include extra parts in case you sneeze & loose a part!

FM-4MC, High Power FM Transmitter Kit $17.95
FM-5, World's Smallest FM Transmitter Kit. $19.95
FM-6, Crystal Controlled 2M FM Transmitter Kit ... $39.95
FM-6, Fully Wired & Tested 2M FM Transmitter $69.95

FM Station Antennas

For maximum performance, a good antenna is needed. Choose our very popular dipole kit or the Comet, a factory made 5/8 wave colinear model with 3.4 dB gain. Both work great with any FM receiver or transmitter.

TM-100, FM Antenna Kit $39.95
FMA-200, Vertical Antenna $114.95

AM Radio Transmitter

Operates in standard AM broadcast band. Pro version, AM-25, is synthesized for stable, no-drift frequency and is setable for high power output where regulations allow, typical range of 1-2 miles. Entry-level AM-1 is tunable, runs FCC maximum 100 mw, range 1/4 mile. Both accept line-level inputs from tape decks, CD players or mike mixers, run on 12 volts DC. Pro AM-25 includes AC power adapter, matching case and bottom loaded wire antenna. Entry-level AM-1 has an available matching case and knob set that dresses up the unit. Great sound, easy to build - you can be on the air in an evening!

AM-25, Professional AM Transmitter Kit $129.95
AM-1, Entry level AM Radio Transmitter Kit. $29.95
CAM, Matching Case Set for AM-1. ..... $14.95

RF Power Booster

Add muscle to your signal, boost power up to 1 watt over a freq range of 100 KHz to over 1000 MHz! Use as a lab amp for signal generators, plus many foreign users employ the LPA-1 to boost the power of their FM transmitters, providing radio service through an entire town. Runs on 12 VDC. For a neat finished look, add the nice matching case set.

LPA-1, Power Booster Amplifier Kit $39.95
CLPA, Matching Case Set for LPA-1 Kit $14.95
LPA-1WT, Fully Wired LPA-1 with Case..... $99.95

Touch-Tone Reader

Read touch-tone numbers from any radio, phone line, tape recorder - any audio source! Decipher called numbers on scanners, radio shows, anywhere touch-tones are used. Memory stores up to 256 digits, an 8 digit display window scrolls anywhere in memory. Memory good for 100 years, even with power off! Runs on 7 to 15 volt DC, Available in kit form with optional matching case set or fully assembled in case set. We sell tons of these to private investigators!

TG-1, Tone-Grabber Touch Tone Reader Kit. $99.95
CTG, Case for Tone-Grabber Touch Tone Reader $14.95
TG-1WT, Tone-Grabber, fully assembled with case $149.95
AC12-5, 12 Volt DC Wall Plug Adapter $9.95

Dinky Radios

Everyone who sees one of these babies says they just gotta have one! Super cute, tiny (that's a Quarter in the picture!) FM radios have automatic scan/search tuning, comfortable ear bud earphones and we even include the battery. The pager style unit looks like a shrunken pager and even has an LCD clock built-in. The crystal clear sound will amaze you! Makes a great gift.

MFMT-1, World's Smallest FM Radio. $11.95
PFMR-1, Pager Style LCD Clock & FM Radio $12.95

Order Toll-free: 800-446-2295

Sorry, no tech info, or order status at 800 number

For Technical Info, Order Status
Call Factory direct: 716-924-4560

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793 Canning Parkway Victor, NY 14564

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ORDERING INFO: Satisfaction Guaranteed. Examine for 10 days, if not pleased, return in original form for refund. Add $6.95 for shipping, handling and insurance. Orders under $20, add $3.00. NY residents add 7% sales tax. Sorry, no CODs. Foreign orders, add 20% for surface mail or use credit card and specify shipping method.

Number 6 on your Feedback card

LETTERS

From the Ham Shack

Dr. Bill Schenker KG4DHJ, [wjs@linkfast.net]. This is to announce the formation of the "Y2K Net," an amateur radio alternative communication system for post-Y2K in the event that we lose all telephone service (which includes cell phones and the Internet). We have announced plans for the net on two Y2K Web sites:

1. TimeBomb2000 [http://www.greenspun.com/bboard/q-and-a-fetch-msg.tcl?msg_id=001PTT]

2. Steve Heller's Y2K site [http://www.koyote.com/users/stheller/y2kneti.htm]

These sites can act as a meeting place for interested parties — look for the thread "The Y2K Net is starting."

The current sked for the Y2K Net is nightly, 2000Z CT, 14.275 primary, 7.245 secondary, 3.905 tertiary. If necessary, slide down to find clear spot, try for 10 minutes or so, then go to next freq. We are hoping to establish local and hopefully regional nets.

Finally, I suggest that those hams who want to participate in the Y2K Net put their E-mail address in the [www.QRZ.com] database file. That way we can contact each other about future sked changes.

Harold F. Byrd, Chula Vista CA. A friend, Chuck O'Harra of Chandler TX, has a son who is a computer consultant. He gave me the following info:

Windows 95, 98, and NT will default into "00" in the year 2000 unless the following corrective measures are taken:

1. Double click on "My Computer."

2. Double click on "Control Panel."

3. Double click on icon "Regional Settings."

4. Click on "Date" tab at top of page. It probably will show a two-digit year where it says "Short Date Sample." That is the *default* setting.

5. Click on the button across from "Short Date Style" and select the option mm/dd/yyyy. NOTE: There *must* be 4 y's showing, not 2.

6. Click "apply," then click "OK" at the bottom.

Easy, fast, simple. 73

SAY YOU SAW IT IN 73!

Number 6 on your Feedback card

UPDATES

Thanks from us and author Parker Cope to Ed Butorajac for pointing out an incorrect **Fig. 2** in W2GOM/7's article "All About Op Amps," which appeared in our August issue. A correct **Fig. 2** is shown here.

Likewise, a grateful Vlad Skrypnik UY5DJ joins us in thanking Ernie Laney K5ENL and others for pointing out an incorrect URL that Vlad inadvertently used in his article "PIC Key, PIC Key" (September). The correct URL under Note #3 should be: [http://home5.swipnet.se/~w-53783]. 73

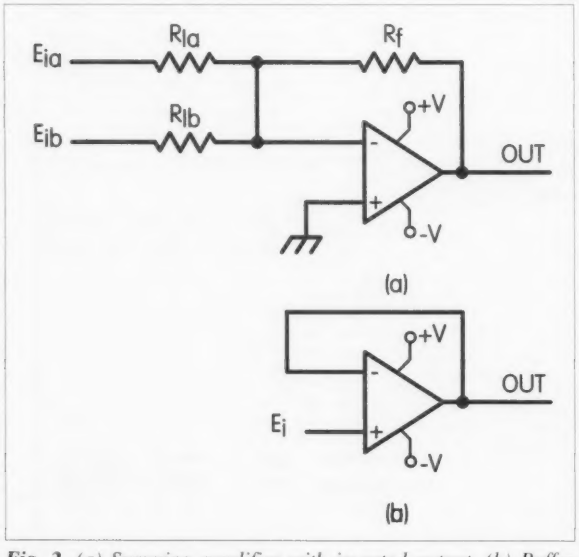


Fig. 2. (a) Summing amplifier with inverted output. (b) Buffer with noninverting output.

NEVER SAY DIE

continued from page 4

Why? (Thanks, WBØFGK)

If corn oil comes from corn, where does baby oil come from?

Why do they put Braille dots on the drive-up ATM keypad?

If nothing sticks to Teflon, how do they get it to stick to the pan?

What has four legs and an arm? A happy pit bull.

Education

You're only going to have the opportunity to make real money when you have your own business. But before you waste a lot of money learning what you need to know to start and run your own business, you want to get other people to happily pay you to learn. And they'll do it, as I've explained before. Several times.

Once you have a job with a small company in a field that is fun for you, you are in school as well as working. You want to use the opportunity to learn how to deal with bookkeepers, accountants, lawyers, bureaucrats, politicians, customers, suppliers, bankers, printers, mailing houses, ad agencies, the post office, and so on.

When you've learned all you can working for one or two small companies, it's time to look for a job as the manager of a company in the business so you can build your management and motivational skills. But, even more important, this is the time to get enough pay to start salting away a startup nest egg and looking over the market for a product to sell.

When I started *73* magazine, I sold my boat, plane, Arab horse, and Porsche to get enough to print the first issue. Well, owning all that stuff was one way of saving and enjoying my savings at the same time. You know, I've never wanted a Porsche, a plane, or a boat again. Been there, done that. I did get another Arab horse when I sort of lucked into it, but in retrospect that was a mistake. The fun and excitement for me is in new things — new experiences.

My envelope supplier had a young Arab stallion he had to sell. He'd run out of money. I bought the horse and broke him to the saddle, but I just didn't have the interest to train him as thoroughly as I

Continued on page 56

MFJ TUNERS

MFJ-989C *Legal Limit* Antenna Tuner

MFJ uses super heavy duty components to make the world's finest legal limit tuner

MFJ uses super heavy duty components -- roller inductor, variable capacitors, antenna switch and balun -- to build the world's most popular high power antenna tuner.

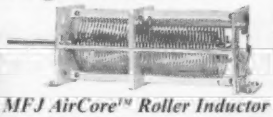
The rugged world famous MFJ-989C handles 3 KW PEP SSB amplifier input power (1500 Watts PEP SSB output power). Covers 1.8 to 30 MHz, including MARS and WARC bands.

MFJ's *AirCore*™ roller inductor, new *gear-driven* turns counter and weighted spinner knob gives you exact inductance control for absolute minimum SWR.

You can match dipoles, verticals, inverted vees, random wires, beams, mobile whips, shortwave -- nearly any antenna. Use coax, random wire or balanced lines.

MFJ-989C **$359.95**

You get everything you've ever wanted in a high power, full featured antenna tuner -- widest matching range, lighted Cross-Needle SWR/Wattmeter, massive transmitting variable capacitors, ceramic antenna switch, built-in dummy load, *TrueCurrent*™ Balun, *scratch-proof* Lexan front panel -- all in a sleek compact cabinet (10³/₄Wx4¹/₂Hx15D in).



MFJ AirCore™ Roller Inductor gives high-Q, low loss, high efficiency and high power handling.

MFJ's exclusive *Self-Resonance Killer*™ keeps damaging self-resonances away from your operating frequency.

Large, self-cleaning wiping contact gives good low-resistance connection. Solid 1/4 inch brass shaft, self-align bearings give smooth non-binding rotation.

MFJ *No Matter What*™ Warranty

MFJ will repair or replace your MFJ-989C (at our option) *no matter what* for one year.

More hams use MFJ tuners than all other tuners in the world!

MFJ-986 Two knob *Differential-T*™

MFJ-986 **$329.95**

Two knob tuning (differential capacitor and *AirCore*™ roller inductor) makes tuning foolproof and easier than ever. Gives minimum SWR at only one setting. Handles 3 KW PEP SSB amplifier input power (1.5 KW output). Gear-driven turns counter, lighted peak/average Cross-Needle SWR/Wattmeter, antenna switch, balun. 1.8 to 30 MHz. 10³/₄Wx4¹/₂Hx15 in.

MFJ-962D *compact* Tuner for Amps

MFJ-962D **$269.95**

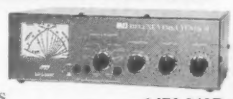
A few more dollars steps you up to a KW tuner for an amp later. Handles 1.5 KW PEP SSB amplifier input power (800W output). Ideal for Ameritron's AL-811H! *AirCore*™ roller inductor, gear-driven turns counter, pk/avg lighted Cross-Needle SWR/Wattmeter, antenna switch, balun, Lexan front, 1.8-30MHz. 10³/₄x4¹/₂x10⁷/₈ in.

MFJ-969 300W *Roller Inductor* Tuner

MFJ-969 **$199.95**

Superb *AirCore*™ Roller Inductor tuning. Covers *6 Meters* thru 160 Meters! 300 Watts PEP SSB. *Active* true peak reading lighted Cross-Needle SWR Wattmeter, *QRM-Free PreTune*™, antenna switch, dummy load, 4:1 balun, Lexan front panel. 3¹/₂Hx10¹/₂Wx9¹/₂D inches.

MFJ-949E *deluxe* 300 Watt Tuner



MFJ-949E **$149.95**

More hams use MFJ-949s than any other antenna tuner in the world! Handles 300 Watts. Full 1.8 to 30 MHz coverage, 48 position *Precision48*™ inductor, 1000 Volt tuning capacitors, *full size* peak/average lighted Cross-Needle SWR/Wattmeter, 8 position antenna switch, dummy load, *QRM-Free PreTune*™, scratch proof Lexan front panel. 3¹/₂Hx10⁵/₈Wx7D inches. **MFJ-948, $129.95.** Economy version of MFJ-949E, less dummy load, Lexan front panel.

MFJ-941E *super value* Tuner

MFJ-941E **$119.95**

The most for your money! Handles 300 Watts PEP, covers 1.8-30 MHz, *lighted* Cross-Needle SWR/Wattmeter, 8 position antenna switch, 4:1 balun, 1000 volt capacitors, Lexan front panel. Sleek 10¹/₂Wx2¹/₂Hx7D in.

MFJ-945E HF+6 Meter *mobile* Tuner

MFJ-945E **$109.95**

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QRX . . .

Four C's of Emergency Communications

Tom Currie N4AOF recently suggested a few simple ways to improve your overall emergency communications capability. Although Tom has a background with Kentucky REACT, his advice can apply to any organization utilizing emergency communications, either paid or volunteer:

The best advice for anyone performing emergency communications can be summarized by the four C's: Calm, Courteous, Correct, and Concise.

CALM. Try to keep emotion out of your voice. No matter what the emergency, a calm, professional attitude will help keep things cool and get the message through more quickly and accurately. Losing your cool, calm attitude may cost an important message. The more reason you have for getting excited, the more important it is for you to remain calm. As an emergency communications volunteer you should set a good, calm example for the other people to follow.

COURTEOUS. You must think of yourself as a public servant. Regardless of provocation, remain courteous at all times. Never display temper on the air. Remember the "Golden Rule" at all times and practice it. Never fight with other operators over calls or reports. Always follow the instructions of the Net Control Station — whether you agree with those instructions or not. Most problems can wait until after the emergency situation is over. If some problem absolutely must be ironed out, do it by telephone or on another frequency — not on the net.

CORRECT. Work to keep errors out of your communications. Use the phonetic alphabet and repeat the message where appropriate to get names, locations, and other information accurately. Write everything down for reference. Remember, your role is communications — you are not in charge of anything. Most communications will be between the people who are in charge. When the Emergency Operations Center or Net Control Station asks a question, go get the answer from the person responsible, don't just give your best guess. It is always better to admit you don't know rather than give out information that is wrong. Always use plain language! Don't use jargon, Q-signals, 10-codes, etc., which may not be understood by everyone. Avoid using specialized words and codes, even those of the agency you are supporting unless the message is going specifically to the same agency.

CONCISE. Your job as an emergency communications volunteer is to get the message transferred while also allowing time for the other operators to get their messages transferred. Avoid tying up the net, by keeping your transmissions as brief as possible. Always leave a few seconds between transmissions in case someone needs to break in with an emergency call. A strictly business attitude is your best technique for ensuring timesaving communications. You must consider the conditions — if everyone is full-quieting, there is little need to spell words, but if conditions aren't good or the word is particularly difficult, then it makes sense to spell it. Don't rush — speaking a little bit slower often gets the message through faster because the other operator doesn't have to ask for repeats. Don't assume everyone has a pad and pencil instantly ready when you need to send him a long or complex message — ask first, which it saves time in the long run.

Thanks to *The Ham Arundel News* (MD), October 1998.

Hams to the Rescue

Greek ham radio operators were among the first to tell the outside world when a massive earthquake struck near the historic capital city of Athens on Tuesday, September 7th. Called one of the worst quakes to hit the Athens area this century, the magnitude 5.7 tremor toppled buildings and other structures in an Athens suburb, knocking out telephone and other normal lines of communications.

According to initial news reports, it was hams who first reported that the death toll had climbed past fifty shortly after the quake rolled through the area.

Stateside, ham radio may be responsible for saving the life of a firefighter involved in Plumas County (CA) fires. Everett Gracey WA6CBA in Reno reported that on Saturday, September 4th, firefighter James Monty was with another firefighter who suffered multiple bee stings. The bee venom put the unidentified firefighter into anaphylactic shock. Monty administered drugs to stabilize the other firefighter and then tried to radio for help using normal fire command radio channels. Owing to the terrain and their isolated location, he was unsuccessful.

But Monty had thought to program one of the ham radio emergency frequencies into his firefighting support radio. He called there and was answered by a ham who passed the information to a RACES operator in the fire communications center. A rescue helicopter was immediately dispatched, and transported the victim to the hospital. Gracey says that it is quite possible that the radio operators helped save this firefighter's life. WA6CBA notes that it is ham radio operators who have volunteered many hours to help fill in the holes in the area's firefighting communications network.

Thanks to *Newsline*, Bill Pasternak WA6ITF, editor.

Top 10 Immutable Laws of Antenna Construction

10. Any given piece of wire is at least 3 inches shorter than you need.

9. In the unlikely event that you have trees in the right places, they won't be tall enough to use for about thirty years.

8. Performance of an antenna is inversely proportional to the time and money spent on it.

7. An allband antenna can be resonated on all bands except the one you need at the time.

6. HF propagation will always be available, twenty-four hours a day, on some band that you don't have an antenna for.

5. The more accurately you measure the materials for an antenna, the more likely you will make a mistake.

4. The more directional an antenna is, the more likely it will be pointed in the wrong direction.

3. Rotation time for a yagi will always be equal to or greater than the time it takes a signal to disappear.

2. A computer model is an effective way to demonstrate how an antenna that works well should not work at all.

And the Number 1 Immutable Law of Antenna Construction:

1. Anything will work as an antenna to some extent, but nothing will work as well as it should.

Thanks to *Low Down*, official journal of the Colorado QRP Club [cqc@aol.com].

FCC Relaxes Rules for Spread Spectrum

The FCC has relaxed rules governing the use of spread spectrum techniques by radio amateurs and opened the door to the possibility of international spread spectrum communication. The Report and Order in WT Docket 97-12 adopted August 31 concludes a proceeding that originated with an ARRL petition in December 1995 and has been pending since 1997.

The FCC adopted rules that will allow Amateur Radio stations to transmit additional spread spectrum emission types. Once the new rules were effective November 1, hams will be able to use techniques other than frequency hopping and direct sequence spreading. In addition, the new FCC rules will permit US hams to use spread spectrum techniques to communicate with amateurs in other countries that permit SS. Spread spectrum communication has been limited to stations within FCC jurisdiction.

The new rules require that spread spectrum stations running more than 1 W incorporate automatic transmitter power control. Amateur stations using SS are restricted to a maximum power of 100 W.

Continued on page 45

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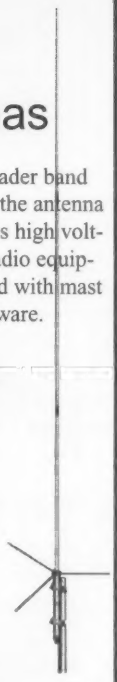
Frequency	144-148/435-450	144-148/435-450
Max Power	200w	200w
VSWR	Less than 1.5:1	Less than 1.5:1
Connector	SO-239	SO-239
Price	$59	$89



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Need a UHF Dipper?

Part 2: Coupling to an outside environment.

Hugh Wells W6WTU
1411 18th Street
Manhattan Beach CA 90266-4025

Part 1 of this series discussed the theory of resonators as used within the older UHF TV tuners and measurement techniques. Part 2 continues with a discussion regarding coupling the tuner, as a dipper, to an outside environment.

Sense loop

For a dipper to function, an external sense loop must be provided so that the dipper will have access to the unknown resonant circuit. For the typical dipper, the sense loop is also the internal resonating element that determines the frequency of the dipper. The design of the dipper allows the resonator to be mounted external to the dipper's box. Then, as the operational frequency rises, the resonator loop gets smaller, making it very difficult to "reach" into the unknown circuit.

The TV tuner design has its resonator mounted in a channel so that access to the outside world is very difficult unless a coupling loop is added to the circuit. Adding a sense loop to the oscillator of a tuner does present some problems that have to be worked out through experimentation. In order to convert the tuner to a dipper, I've elected as a first priority to get the oscillator operating at the desired frequency band. A sense loop may be added using one of the two schemes discussed later, since tuners vary in the way they respond. Both schemes will have to be tried and evaluated in order to select one over the other. A suggested sense loop is shown in **Fig. 1**, where the dimensions are only approximate.

I've observed several factors relative to the sense loop that may be of concern to some users. The loop has a natural resonant frequency that may fall within the frequency range of the oscillator. Another possible concern is the dip reaction that is a function of energy absorption from the oscillator. Another concern is the oscillator's reaction to a sense loop located near the oscillator's resonator. I've observed quite a variation from tuner to tuner, so that experimentation with the loop is necessary.

The actual depth of the dip is a function of the coupling factor and energy absorption from the oscillator by the resonant circuit being tested. One of the simple tests that works most of the time is to check the loop's reaction to hand capacity. As with a typical dipper, placing the hand on the sense loop

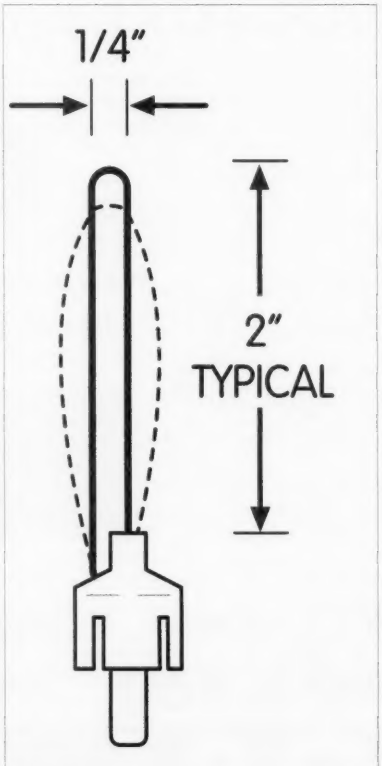

Fig. 1. Typical sense loop mounted on a phono connector. Initial dimensions are shown. The dotted line indicates a possible change in the profile when used with the dipper.

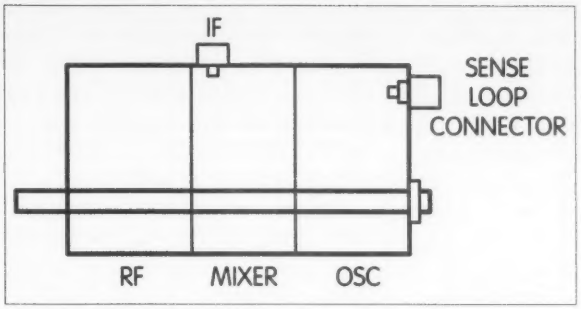

Fig. 2(a). Suggested mounting location of the sense loop connector.

should cause a reaction that is observable on the meter.

When the sense loop resonates within the tuning band of the oscillator, a dip may be observed within the tuning range of the tuner-dipper. Therefore, it's desirable to place the loop's resonant point outside of the tuning range of the oscillator. Or, the dip caused by the sense loop may just be ignored.

I've found that mating phono connectors work well for mechanically supporting the sense loop. Soldering the female connector to the wall edge provides the needed mechanical stability. When the sense loop connector has been placed in a final location, a wire may be formed and soldered over the top of the mounting portion to increase the mechanical support of the connector, as shown in **Fig. 2**. It is important to place the connector close to the corner of the tuner's box, adjacent to the cold end of the resonator.

Sense loop schemes

There are two sense loop connection schemes that appear to work, but each is tuner dependent and the one that works best with your tuner may be the better choice. The first scheme is to connect the sense loop through a capacitor to the RF end at the mixer diode. The oscillator's injection loop is then shared by both the diode and the sense loop. The second scheme is to use a separate pickup loop as part of the sense loop circuit. Each of the sense loop schemes has an advantage and disadvantage requiring evaluation.

The objective of the sense loop is to allow absorption of RF energy from the oscillator by an external resonator. Yet, the coupling factor must be minimized to allow the oscillator to continue oscillating with minimum sense loop loading. Therefore, adding a sense loop means that the loading on either the diode or the oscillator will occur depending upon the connection scheme that is elected. Paralleling the sense loop and the diode works well sometimes.

Having the sense loop linked directly

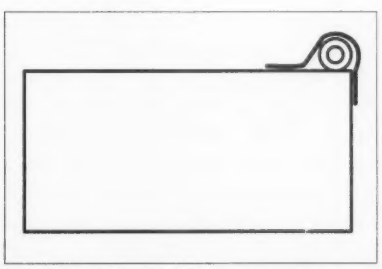

Fig. 2(b). Increasing the mechanical rigidity of the connector by soldering a wire over the mounting portion.

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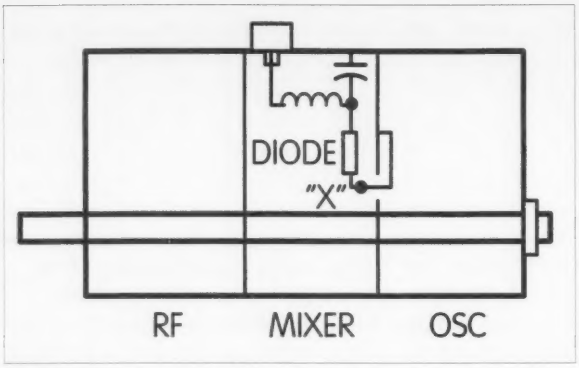

Fig. 3. Typical location of the mixer diode and the sense loop connection when the capacitor scheme is used.

to the oscillator resonator may sound like a better choice, but it creates a new set of issues that must be resolved. Any loop of wire placed near a distributed resonator will be "seen" as a parallel inductor by the resonator, causing it to increase in frequency depending upon the amount of coupling between the two. In addition to affecting the resonant frequency, the loop will also upset the oscillator's feedback, creating an interesting effect. At some points within the tuning range the resulting "dip" indication will be normal, while at other points the oscillator's RF level will actually increase. Regardless of a dip or peaking condition, a reaction occurs, providing an indication of resonance at the test frequency.

Fig. 3 shows both the typical mixer diode mounting and a suggested point for attaching the sense loop if this scheme is selected. Some tuners have the diode body mounted in the wall, and when that's the case, the connection should be made on the oscillator side of the wall as close as possible to the diode body.

When both the diode and the sense loop use the same oscillator injection pickup loop, it is suggested that a coupling capacitor be used between the sense loop connector and the diode as shown in **Fig. 4**. The capacitor value is not critical, as its function is to break up a DC path through the sense loop. Capacitance values between 50 and 470 pF have proven to be satisfactory. The precaution for using the capacitor is that some tuners actually have a DC bias placed on one end of the mixer diode. Although the bias value isn't required in the dipper project, it's easier to accommodate the circuit than to modify it.

Using a separate sense loop pickup loop presents some interesting situations that do not have a "cookbook" solution. Several loop positions must be attempted in order to find the one method that works best. Keep in mind that the objective of the loop is to allow an external resonator to absorb energy from the oscillator. The "sticky wicket" is being able to sense the absorption by the external circuit and simultaneously indicate that absorption by a dip on the meter. It sounds easy, but may not be because the RF field level detected by the diode must also be reduced when absorption occurs. In some cases, placing the pickup loop close to the diode loop works because the field pattern around the diode loop is disturbed when absorption occurs.

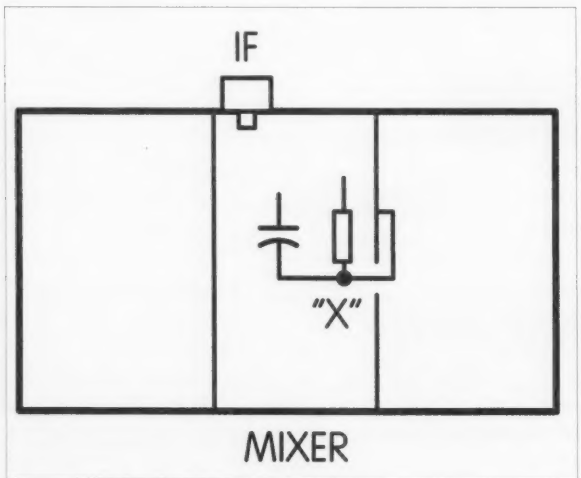

Fig. 4. A coupling capacitor is used when the sense loop and diode share the same pickup loop.

In other cases, absorbing energy directly from the resonator works because total oscillator power is reduced during absorption.

Three starting loop positions for placing the loop are shown in **Figs. 5(a), (b)** and **(c)**. So far, as I've observed, the sense pickup loop should be placed within the I field of the resonator. The best position for the pickup loop can be determined only through trial and testing. Sensitivity to hand capacity is a simple and positive indication of "working."

Testing

Before applying power to the oscillator, a few jumpers need to be installed to disable three circuits. The first one is to ground the varactor's voltage control terminal when a varactor is used. Then a jumper wire needs to be soldered from the top of the variable capacitor/resonator to ground for both the RF and mixer circuits as shown in **Fig. 6**.

Supply voltage for the oscillator should be regulated for stability, but may be any voltage from about 12–20 volts. Some oscillators work well at low voltages and others require 18–20 volts after being modified. I recommend about 15–16 volts as a starter, in order to keep down the transistor's dissipation.

With the sense loop removed and with a meter monitoring the rectified DC output from the mixer diode, the meter should move upscale when the voltage is applied to the oscillator. The next step is to rotate the variable tuning capacitor while observing the meter. Under normal circumstances, the meter's indicated level will move smoothly up and down the scale as the capacitor is rotated, but the indication should not go to zero.

Once the meter's amplitude and variations are noted, install the sense loop and repeat the tuning rotation. If

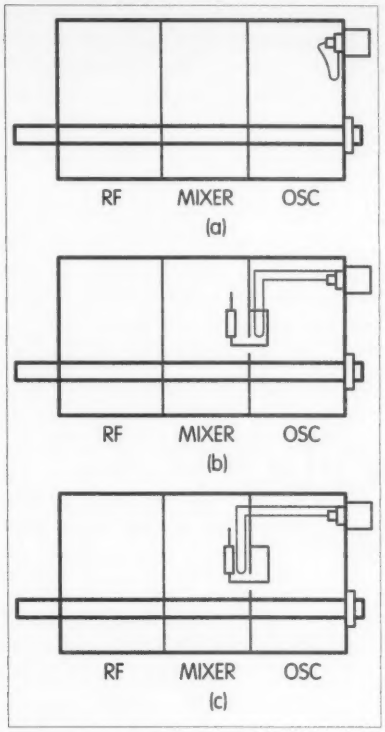

Fig. 5. Typical locations for sense loop trials when this scheme is used. (a) Shows a short loop placed in the I field close to a wall. (b) The pickup loop is extended and placed next to or over the diode injection loop. (c) The extended pickup loop is placed close to/or over the diode.

no abrupt changes occur in the amplitude, then the sense loop is not affecting the oscillator. However, there may be a decrease in the meter's amplitude indication as a result of connecting the loop. Some adjustments in the loop's profile and/or length may improve the meter's amplitude and dip response. A decrease may occur in the meter's indication when the sense loop shares the diode loop because of loading. The "fix" is to continue operating at a lower meter current level.

At this point, the oscillator should be operating over the "stock" operating frequency range of about 470–900 MHz. Using whatever means is available, measure the frequency at each end of the tuning range so that you'll have a reference of where the oscillator is now as a starting point for the next step in the modification process. If an absorption wavemeter is to be used, then now is the time to calibrate a point or two on its scale.

The use of the absorption wavemeter will provide clues as to the depth of the dip as observed by the tuner-dipper. Sometimes the wavemeter being tuned in proximity to the sense loop provides a better dip indication than does tuning the dipper in proximity of the wavemeter. This phenomenon is caused by loop loading and sometimes by the narrow tuning range of the tuner-dipper's oscillator after it has been modified.

Parts 1 and 2 provided discussions regarding the use and testing of a UHF mechanical TV tuner used as a dipper. Part 3 will describe progressive modification steps that may be used to shift the operating frequency range of a UHF tuner into an adjacent ham band.

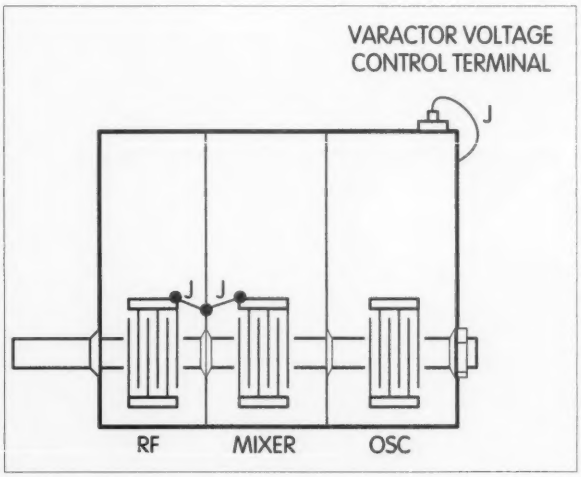

Fig. 6. Jumper wires added to disable RF, mixer sections, and the varactor.

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Planning a DXpedition

Here's what to do if you *take Wayne's advice ...*

Denis Catalano W4DC
14453 Alps Drive
Woodbridge VA 22193

As a result of Wayne's persistent urging to go and do something interesting, about every four years members of the Woodbridge Wireless Inc. (WWI) go on a DXpedition. This year, we went off to San Andres Island, Colombia HKØF. In 1995, it was Montserrat VP2MFM; in 1991, it was zone 2 in Canada VE2/WD4KXB; and in 1986, it was Cayman Island ZF2HI. All of these DXpeditions were very successful, and coincided with a major contest. But the real common thread for all these DXpeditions is a systematic approach to planning. My crutch for doing this is the Planning Task List shown in **Table 1**. This list for DXpedition planning should work for all but the most rare destinations. I go through this list so thoroughly that some members of the team say, "Denis, don't take all the fun out of it!" But even with all the planning, there are still many unknowns. The more problems you can solve at home, the more fun you will have on the DXpedition. I will briefly examine each item and relate it to our most recent DXpedition, so you, too, can join in on the fun of successful DXpeditioning.

Item #1, country selection, actually goes on in conjunction with items #2, #3, #4, and #5, since they are all related and can influence country selection. We make a list of DX countries that haven't been really active recently, and which also fit the contest we plan to operate. If it's the CQWW contest, we look at countries in the rarer zones. If it's the ARRL DX contest, we look at the rarer DX countries not too far from the States. You can decide what your country selection process will be. The only restriction that our group has placed on our selection process is picking a place with electricity, since the cost of a DXpedition is really impacted by having to take gasoline and generators. With this restriction, only the rare uninhabited DX entities

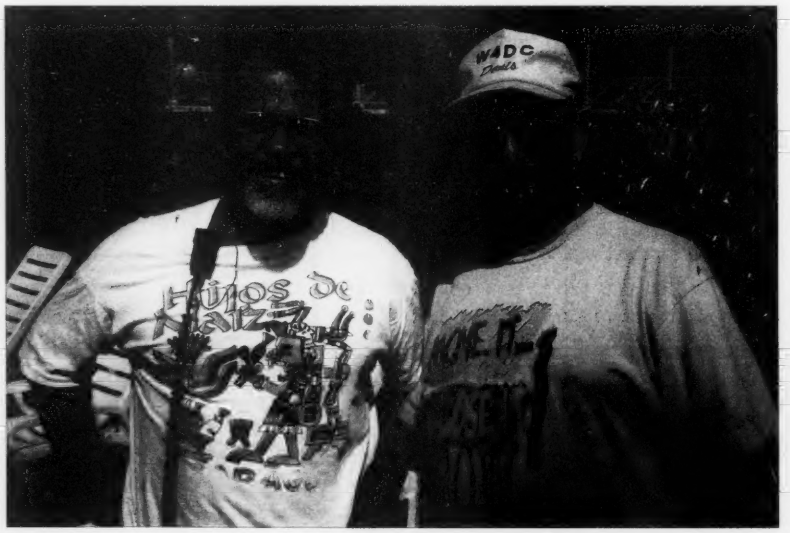

Photo A. *San Andres ham Richard Bard HKØHEU meets author Denis Catalano W4DC. Richard was of great assistance to the HKØF DXpedition team.*

are omitted from our universe of choices. We also determine how difficult obtaining a license will be. If the chances of getting a license are very low, you may want to leave that country to the very serious DXpeditioners. You also have to be able to get to where you want to go. So investigating the transportation options (#5) is also instrumental in choosing a country. By this time, I usually have a core group together who are really interested in going on a DXpedition. This not only splits the planning workload, but also gives ownership to the team members.

Continuing the planning process, we usually start out with a long list of DX countries and end up with a short list, after going through the process. With the short list in hand, we try to contact other hams, both stateside and resident hams, who have operated from the DX locations being considered. I call these items intelligence (#2) and local liaisons (#3). This is much easier today with the Internet and E-mail than it was just ten years ago. Also, while contacting the DX hams, you should be building friendships that will pay off later. Richard Bard HKØHEU (see photo) became our primary DX point of contact and, based on his inputs, we

DXpedition Planning Tasks	
#	Task
1	Country selection
2	Intelligence (contact visitors/hams)
3	Local liaisons (DX country hams)
4	Licensing
5	Transportation to DX location
6	Team selection
7	Accommodations/site selection
8	Local transportation
9	Customs info and contact
10	Equipment coordination
11	Computers
12	Financial accounting
13	Home page
14	Sponsorship
15	Publicity
16	T-shirts
17	Setup
18	Operating strategy (category, headings, propagation, op skeds)
19	Food
20	Photography/video
21	Score submission
22	QSL chores (design, print, manage)

Table 1. *DXpedition Planning Task List.*

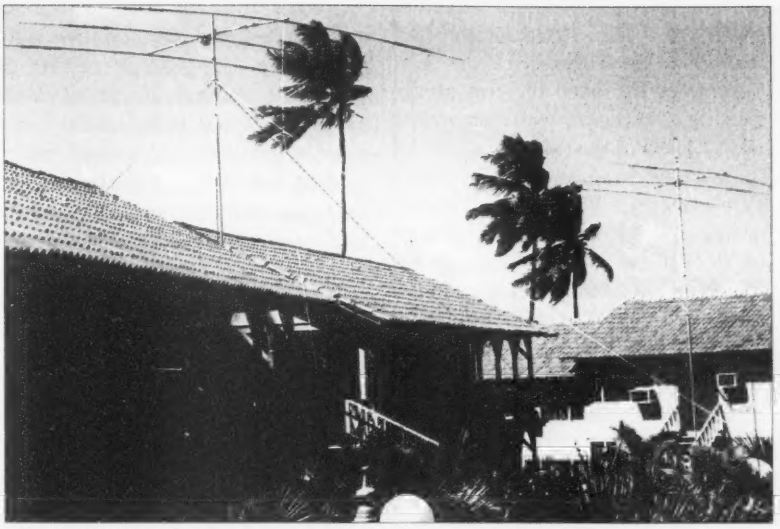

Photo B. *The HKØF team mounted their two yagis on water pipe purchased on the island.*

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selected San Andres Island. Once the country has been selected, the planning really goes into high gear.

Next, we recruited the rest of the team (#6). We started with members of our club who wanted to go on the DXpedition, and then filled in empty slots with others who have participated in our past DXpeditions. We always try to take one person who has never been on a DXpedition, but has a burning desire, and at least basic operating skills. The main thing to remember here is that the group needs to be compatible and willing to work together. The San Andres operating team was made up of Ed Pitts K5OF, Carl Henson WB4ZNH, Martha Henson WN4FVU, Everett Jackson WZ8P, Vic Walz N2PP, Jack Ference AA3KX, and me. Jack was the WWI member who never had been on a DXpedition, but really was anxious to go. It turned out great, with Jack doing most of the CW duty. With the DXpedition team formed, weekly messages (E-mails) were sent to each team member summarizing the status of each task that had been assigned to one or another. We also formed a support team. These were mostly club members who wanted to be part of the effort. They helped take care of licensing arrangements, communications home, local transportation, computer programming, the home page, QSLing, T-shirts, and many other tasks.

We had already started the licensing (#4) and transportation (#5) investigation as part of the country selection, so with a country selected and a team recruited, these items were worked through to completion. For our DXpedition to San Andres, neither of these tasks was easy. First of all, most travel agents and airlines have never heard of San Andres, so much of the legwork was done by us. Since there are no direct flights from the U.S., we had to find alternate connections. One was through Bogota, Colombia, and the other through San Jose, Costa Rica. Two members of the team took the Bogota route, while the rest of us went through San Jose. Because of the sporadic and frequently changing flight schedules of the connecting airlines, it took most of us an extra day in both directions. Up until the week before departure, we weren't sure of the secondary airline schedule, but everything worked out in the end.

Getting our licenses was also a bit difficult, but with the help of the American Embassy in Bogota, we received our slant calls (to be used before and after the contest) about fours weeks before our departure. Our request for a special contest call initially went unanswered, and we then decided on using my call HKØ/W4DC for the contest. After being on the island four days (one day before the contest), we received word on the air from several American hams that our contest call had been issued and the Colombian Radio League was trying to get in touch with us. Things worked out, and we received a fax several hours before the start of the contest — HKØF had become a reality!

Finding suitable accommodations (item #7), which had not been too difficult on prior DXpeditions, turned out to be more difficult since rental properties weren't the norm on San Andres. In fact, we only found three choices available. The final selection for our DXpedition QTH was the Caribe Campo Hotel, located in San Luis on the east side of the island. The food task (#19) was basically eliminated on this DXpedition, since the Caribe Campo had an all-inclusive food plan that turned out to be terrific. Even with all the planning, we still weren't sure that the hotel villa that we rented was going to work out. Just a few weeks before our departure, we were notified that the hotel villa would not be available. Again, everything worked out in the end, and the hotel rooms we used actually added more flexibility to the antenna situation. Even though we were treated very nicely by the hotel staff, the electrical power and water (especially hot water) was sporadic. In fact, most of us didn't have a hot shower all week, but no one complained since everything else worked out so well — and after all, this was a DXpedition. Planning for local transportation (#8) was also completed. The choices were renting a vehicle or depending on taxis, buses, or local hams. We found rental cars to be very expensive, so we decided on taxis this time out.

Items #9, #10, and #11 go hand and hand, and are the most involved of all the DXpedition tasks. Equipment coordination takes lots of negotiation and planning between all the team members.

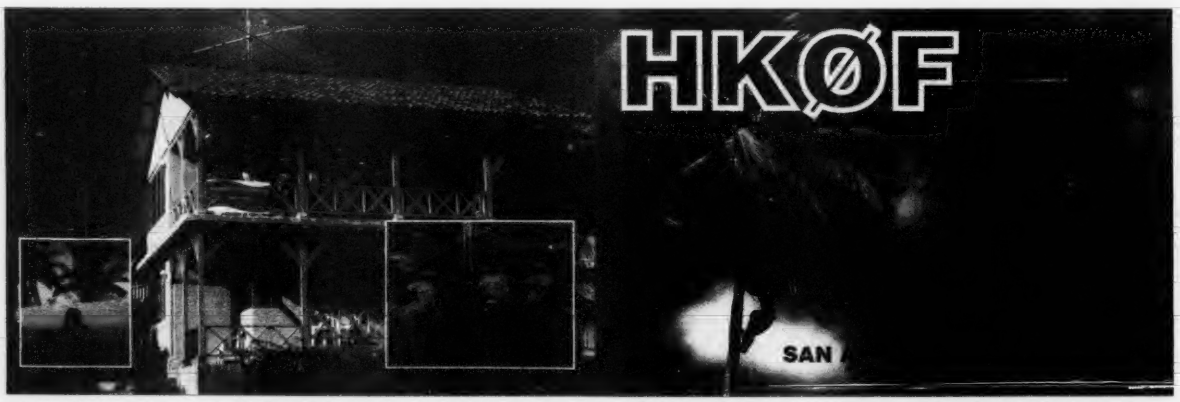

Photo C. *Featured on the folding QSL card cover (back at left, top at right) is an islander who was paid $10 to climb the palm tree to attach the dipoles.*

You want to choose a leader for these tasks who is organized and determined. The customs planning was also complex — keeping track of and certifying all the equipment. Even though we didn't use much of the official paperwork, it was better to be prepared than to be sorry. An overall operating strategy (#18) was developed, since it impacts the type and quantity of equipment and computers. Our basic strategy was to have a two-station DX/contest expedition, Field Day–style, with the group bringing and setting up all stations and antennas. We decided to operate in the multi-two category during the ARRL DX phone contest, and to concentrate on CW and RTTY before and after the contest. The equipment list turned out to be over 10 pages long and included three amps, two beams, two verticals, three transceivers, three computers, numerous tools, wire, over 1000 feet of coax, RTTY gear, and many other accessories. The only items that we didn't carry with us were antenna masts/towers — we purchased 60 feet of two-inch water pipe on the island to support the antennas. Consequently, the group shared over $900 of overweight baggage charges.

The actual setup (#17) wasn't as completely planned because we had no idea of the lay of the land. So two members of the team arrived two days earlier than the rest of the group, to survey the situation and get things laid out. They arranged for an islander to climb palm trees (at $10 a tree) to erect our wire antennas (see photo featured on our QSL card). They also scoped out the vertical field, and purchased the support pipe. When the rest of the team arrived, the yagis for 10/15/20 meters were put up relatively quickly (see photo), but the verticals for 80m and 160m took a lot of time to set up properly. The advance team selected one of the four hotel rooms as the radio shack, and doubled up in the remaining three rooms as sleeping quarters. Some "rewiring" had to be done in the rooms to support the two 220 VAC amps. In all, it took about four days to set everything up the way we wanted, which is one reason the "on the air" time before the contest was a bit limited. We tried to keep a RTTY station on the air since this mode was frequently requested.

Many of the other planning items are self-explanatory. One team member kept track of group expenses and collected group monies (#12). We had a support team member from Woodbridge Wireless develop and maintain the home page (#13). It was extremely successful, and includes a log checker and a guest book for comments (check out the Woodbridge Wireless home page, which has additional information about all four of our DXpeditions [http://www.pwcweb.com/wwi/]). We didn't really seek out much sponsorship (#14), but did get the loan of two vertical antennas from Force 12. I took care of the publicity (#15), which consisted of press releases to all the DX bulletins and magazines when the time was right. Like most DXpeditions, we made T-shirts (#16) for the group that also doubled as gifts to our helpers here and abroad. Wearing our T-shirts with the words "Radioaficiondos" seemed to help going through customs. We also assigned a lead person for photography and video (#20). Once home, I had the task of pruning four hours of videotape into a 15-minute video with authentic island music (15-minute professional videos are available on loan for both the VP2MFM and HKØF DXpeditions). Score submission (#21) turned out to be harder than anticipated because the merge function wouldn't work with so many Qs. Lastly, but not trivial, are the QSL design, printing, and managing tasks (#22). Our group decided to do it up right with a color foldout card (**Photo C**).

All of the planning paid off. The HKØF contest operation alone totaled 11,785 QSOs. After the contest, operations continued using the individual HKØ/home callsigns with emphasis on CW and RTTY. The final QSO totals before and after the contest by mode were 1093 on RTTY, 3236 on CW, and 2144 additional phone Qs, for a grand total of 18,258 QSOs for the San Andres DXpedition. If you still need a QSL for any of the DXpeditions, send an SASE via my *Callbook* address. Now, start planning a DXpedition of your own! 73

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Why Not ß-Morse?

An amusing way to preserve your Morse code.

Jean-Yves Morin VE2MHZ
12 405, rue Crevier
Montreal QC H4K 1R3
Canada

Nowadays Morse code is waning its way out of civilian sectors as well as military ones. The work required for its conservation lies mainly in the hands of radio amateurs and other practitioners who have been led to it by trade, interest, or simple curiosity.

As you probably know, the actual International Morse code can produce the real international alphabet, containing letters outside the Roman alphabet (seen here) that also have their Morse counterparts in dots and dashes. These letters are used in languages such as Russian, Greek, Arabic, Hebrew, and so forth.

However, each character composed of dots and dashes is out of visual proportion with its equivalent letter, the former being more of a linear shape than the average shrunken shape of the latter. With these in mind, why not build characters out of the actual Morse code? They should have all the qualities of commonly used alphabets, with each character simple and easy to read, and abiding by these simple-to-follow rules:

1. Each letter shall be composed of four or fewer elements (dots or dashes).

2. Each successive element shall turn at ninety degrees right from the previous one, and this angle shall replace the original space.

3. Only letters of the alphabet shall be used; signs or numbers shall remain the same for any language.

4. Accentuation and syllabication shall remain the same as in the original language.

The new characters, in their separated and compact form, would be well adapted to handwriting, contact printing such as typewriting, TTY, or other means of printing, or simply to be read from a screen. Software would be also feasible for other font-type generators such as computers and microprocessors.

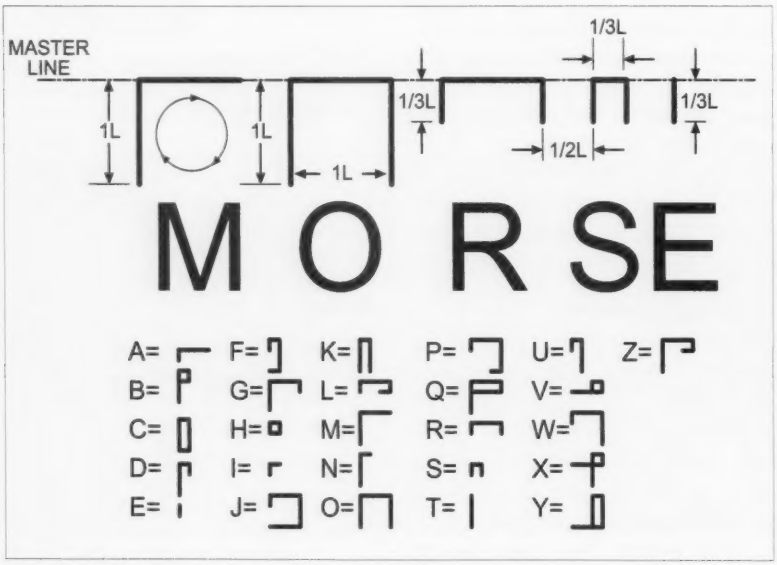

Fig. 1. ß-Morse illustrated.

Continued on page 43

Building a Better Collins

Add this $1 solid state replacement part to your 30S1.

Ronald Lumachi W2CQM
73 Bay 26th Street
Brooklyn NY 11214-3905
[W2CQM@JunoCom]

It's often said that "necessity is the mother of invention." And to my mind, never has this cliché been more true than when I attempted to search out a reasonably priced Collins 30S1 linear amplifier replacement component for this vintage piece of radio gear. Anyone in a similar situation knows full well that it's almost a contradiction in terms to find an adequate supply of anything labeled Collins at a cost that's considered even remotely reasonable.

Take, for example, the almost impossible task of locating the Amperite (115NO180) 120 VAC [Readers should note that original voltages in Collins and similar vintage equipment were of course listed as 115 VAC; we have changed these to the more modern convention of 120 VAC. — ed.], 180-second time delay ballast tube with normally open contacts. Its singular task is to fundamentally time and control the entire interlock circuit. This component is the absolutely essential ingredient in that series of intricate circuits that delay the application of high voltage to the plate of the tube until the indirectly heated cathode has reached operating temperature.

How, exactly, is the timer designed to do what it does? When powering up the amplifier, one function is to route 120 VAC to the relay heater. The resistive wire winding is designed to generate heat, causing the bimetallic strips to move together and to complete the circuit mechanically. In concept,

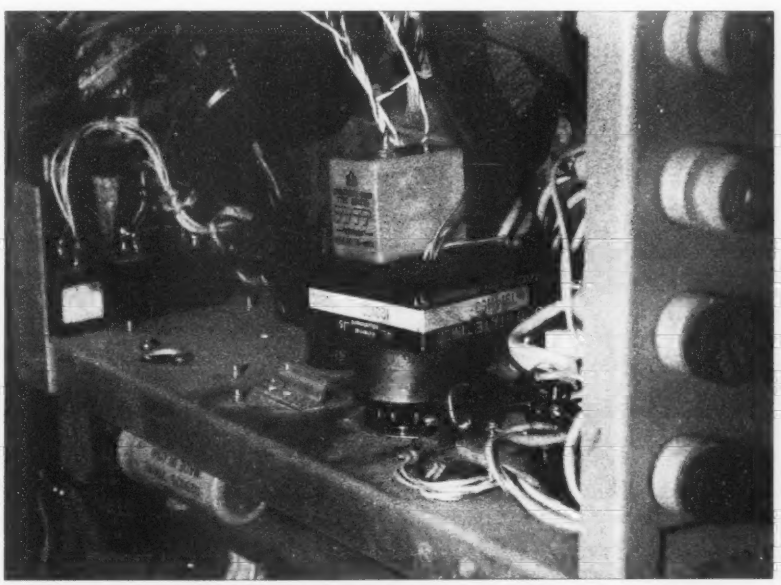

Photo A. *A view of the replacement time delay module. Note the module overhang above the diodes. You'll need clearance for K203 (barely visible) to the rear of the timer package. The wires above the 120 VAC [see text note in column 1 re 120 VAC] ice cube–type relay are connected to a second set of normally open contacts on the relay and will eventually control voltage to the two bulbs behind the plate and antenna tune dials. See text for details.*

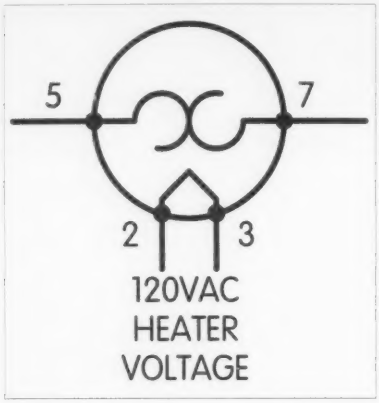

Fig. 1. *A schematic representation of the three-minute time delay relay as it appears in the Collins manual.*

it's a little like the optional bulb that comes along with the string of Christmas lights to make them "blink."

In any event, a 30S1 outage caused by this malfunctioning tube was personally experienced by yours truly when the 120 VAC heat generating wire in that timer tube suddenly let go. It worked well for a Saturday morning 40 meter swap net, but when fired up the next day, it was as dead as the proverbial doornail. I guess its time was up and it went out in a flash like a light bulb.

A quick continuity check across pins 2 and 3 of the tube confirmed my worst suspicions. The circuit was open. In hindsight, I guess it was a reasonable thing to expect, especially since this tube was the original Collins part installed well over 30 years ago. In my naiveté, I thought all I needed to do was to plunk down a couple of bucks for a replacement and that case would be closed. Checking out some sources of supply resulted in a heart-stopping, pulse-quickening, shortness-of-breath experience, when I learned that this lowly tubelike component, when and if available, commanded a $75–$125 price tag — a premium a bit too dear for me to swallow, especially since I have two 30S1s. However, I'm happy to say that after a tearful weekend of lamenting the tragedy, as well as suffering a loss of appetite, a clearer head prevailed and a unique and cheap solution became apparent.

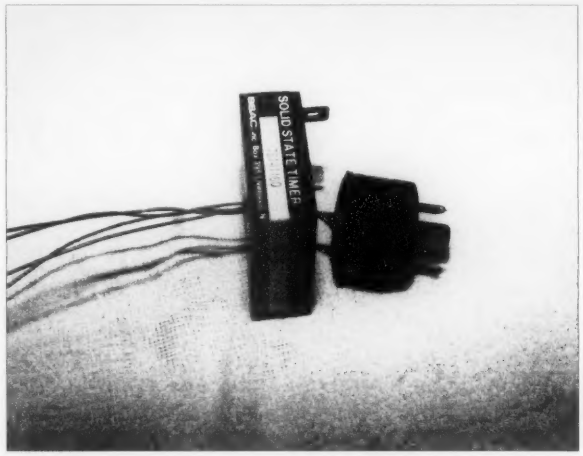

Photo C. *Two pair of color-coded wires have been soldered to the appropriate pins of the socket. After passing the lengths of wire through the hole in the center of the timer module, epoxy the socket in place. See the instructions for correct positioning to ensure clearances.*

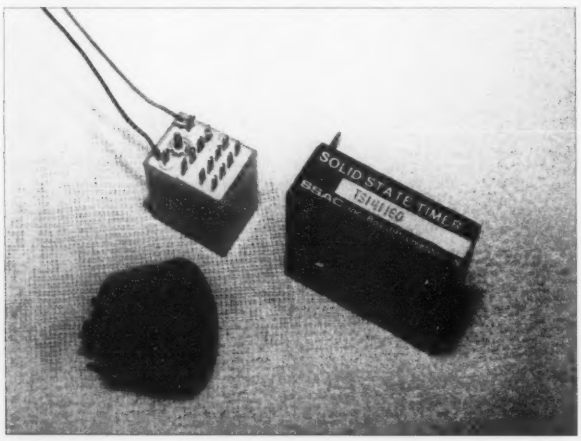

Photo B. *The three components comprising the replacement timer in the 30S1. Note that an octal socket has been hollowed out. Any type of 120 VAC relay will work. Pictured is a 4PDT. The two wires have already been soldered to the coil input. The solid state hockey puck–style timer is completely epoxy-encased except for the two fast-on connectors. One is visible on the upper left side of the module. The module has application in any home-brew amplifier deck project using an 8877 or the 3CX800A7 tube requiring a three-minute delay.*

There was a better and cheaper way!

A careful look at the 30S1 schematic was all that was necessary to conjure up a safe, quick, inexpensive, and far better alternative to biting the bullet and paying big bucks for a replacement OEM plug-in relay from some supplier who felt that he was doing me a favor by taking my hard-earned money. I also realized that the wiring of this tube is relatively uncomplicated to understand and offered no surprises if any repair was contemplated.

For example, there are only two 120 VAC input connections at the tube socket (pins 2 and 3) to the heat generating glow-in-the-dark windings within the tube that close the contacts. (See **Fig. 1**.) There are two remaining connections (pins 5 and 7) that are needed to complete the first leg of the interlock circuit. 30S1 owners are aware that the time delay tube is conveniently found on the relay shelf of the amplifier, so it's no big deal getting to the part and doing whatever maintenance is necessary.

Even more gratifying, I discovered that there was more than sufficient room around the tube socket to do what I had in mind with a somewhat larger replacement component. What made me even less gloomy about the amplifier downtime was the fact that all the wiring connections could be made directly from a stripped down octal socket without any modification whatsoever to the original circuit.

My confidence in solving the big cash outlay dilemma was based on a catalog retailer's advertisement I had responded to some time earlier. The company offered a solid state 120 VAC, 180-second (a 150-second

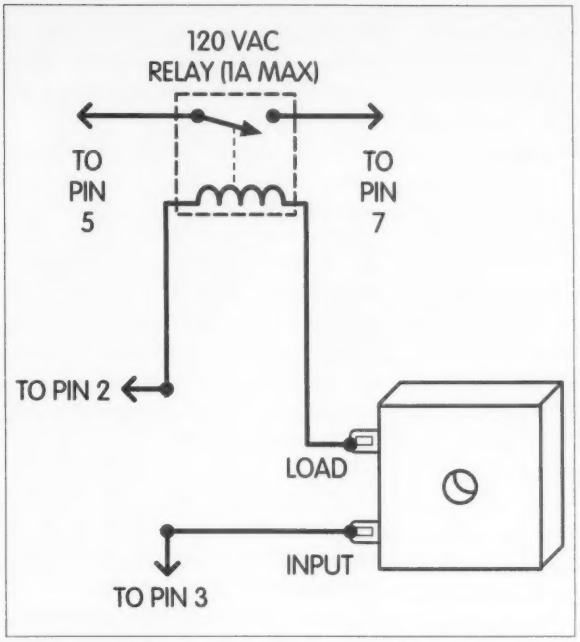

Fig. 2. Simplified wiring scheme. Pin 2 and Pin 3 refer to socket K202.

heavy-duty unit also available) time delay relay for one dollar. At that time, I purchased a bunch of them for a project requiring a timed delay for a pair of 8877s nested comfortably on an RF deck. The component worked flawlessly in that similar time delay circumstance, so I was assured of success in this application.

Basically, the timer circuit is completely clad in epoxy (see **Photo B**), except for a pair of fast-on hookup terminals protruding from its hockey puck design. Since it's completely enclosed, it's impossible to figure out how it works. What counts is that it operates flawlessly each and every time, so needing to know about its innards is strictly academic.

It's configured to control voltage to any 120 VAC appliance with a rating of up to one amp. To get it working, feed one leg of the 120 VAC line to the "Input" side of the cube. Wire the "Load" side (in this case) to one terminal of an outboard SPST (NO) relay. Hook up the other hot leg of the 120 VAC line directly to the remaining terminal on the relay coil. Plug it in and start counting "one thousand one, one thousand two ..." After exactly 180 seconds, the contacts on the outboard relay mysteriously close and the rest is history. If that sounds interesting, read on!

What's first to do?

In order to assemble the self-contained, plug-in module components necessary to replace the tube-type relay, all that's needed is an octal (8-pin) tube socket base, the one-buck module, and an SPST or SPDT (more on a DPDT option later) 120 VAC relay with about a 3–5 amp normally open contact rating. There's nothing critical here, so just about any relay will work. It is interesting to mention that even though my time delay tube was a goner, I couldn't bring myself to trash it for its base. It was a little like having difficulty saying good-bye to a lifelong friend. I guess the thought flashed through my mind that through some divine intervention, it might

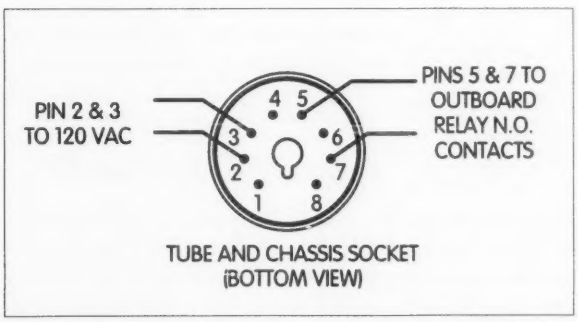

Fig. 3. Bottom of time delay tube socket showing pin numbering.

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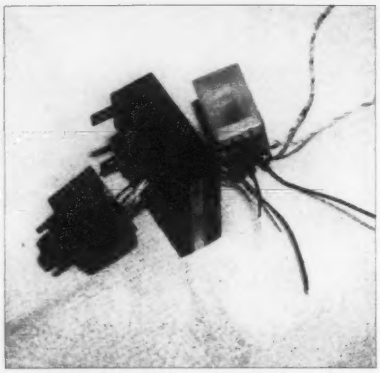

Photo D. *An "exploded" view of the component parts. Note the two fast-on connectors. Epoxy the socket base and relay to the module. The pair of striped wires in the upper right will control the two bulbs behind the plate and antenna tune dials.*

somehow come back to life at a later date. As an alternative, I found an old circa 1960s tube in the junk box that in a sense was given a partially new life for the new millennium by donating one of its "vital organs" to a good cause.

One quick thought! In your search, you may come across a tube with fewer than 8 pins. That might be OK to use just as long as pins 2, 3, 5, and 7 are in place. Many of the vintage rectifier tubes fall into this category. Just remember that the pin locations are counted from the underside of the tube socket, so pay careful attention to the illustrations. It can get a bit confusing — especially if you're like me and not especially good with spatial relationships.

To get rid of the glass envelope, wrap the tube in an old towel and carefully break it with a hammer. Stay away from hammering around the plastic base. It's fragile. Cut out all the interior wires and remove the embedded glass within the socket base.

Using a soldering iron, apply some heat to each of the four identified pins to soften the solder and free the remnants of the wire within the pin. Simultaneously, hit your hand sharply on the table top and the solder will eject itself. Make certain that the tube prongs are open to the interior of the socket. If you've gotten this far, the hardest part of the job is behind you.

Assembly is simple

Strip off about one inch of insulation from two 6" lengths of solid wire and solder one end to pin 2 and one length to pin 3 of the hollow socket. When positioning the wire from the inside of the socket, make certain it extends beyond the length of the pin for a good solder connection. Clip off any excess. Since high current is not an issue, I found that four conductor, solid telephone hookup wire works well. It might be a good idea to color code the interior connections. It's amazing how quickly you can forget what wire goes where. I used red for the 120 VAC. Do the same thing with a pair of wires (I used green) to pins 5 and 7. Refer to the pictorial for pin numbering. If any mistakes are made, they will be made here. I know full well, because I made them.

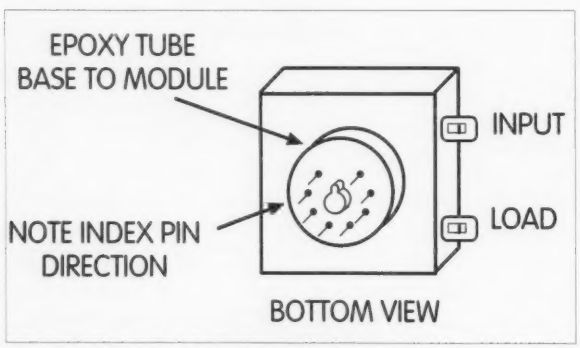

Fig. 4. *Location of hollowed out octal tube base prior to bonding to timer module with epoxy. Positioning is vital to ensure clearances on relay shelf. Note the position of the indexing pin with respect to the fast-on connectors on the module.*

I completed the whole job (epoxy and all) and plugged it in. I'd still be waiting for the unit to time on if I didn't suspect I made a wiring error. I forgot that looking at the base of the tube is not the same as looking at the base of the socket. It was that mirror image that confused me; however, I reconciled myself to that careless error by claiming that no one works on tubes any more. I'll only say that a word of caution to the wise is usually sufficient!

Pass the bundle of wiring from the hollow tube socket (four strands) through the convenient hole found in the time delay module. (See **Photo C**.) At this point, you might want to take some time to epoxy the socket to the underside of the time delay module. To ensure clearance with relay K203 on the shelf, orient the socket indexing pin as shown in my pictorial. Position the module so that the two fast-on terminals, protruding from the module, are to the right. The socket is placed closest to you with the indexing pin facing away (up). Clamp it in place or use a rubber band until the epoxy hardens.

Make certain to get this orientation right. You'll want the timer module to overhang the diodes on the relay shelf and stay well away from relays K203 and K201. Epoxy a small outboard 120 VAC SPST (NO) or SPDT relay (no other voltage will work) to the top of the timer module. Center it on the module. Height clearance is no problem in the 30S1, so any size 1 amp relay you have will work fine. Solder one length of red wire from either pin 2 or 3 to the input terminal on the module. It's clearly marked, so there's no problem with which wire goes where.

Connect a short length of wire from the remaining load terminal (also marked) to one of the coil windings on the relay. Trim to length and solder the remaining red wire from the socket pin to the other coil connection of the outboard relay. The two remaining green wires are connected to the normally open contacts on the outboard relay. If you happen to have a DPDT relay, make certain that you connect to the terminals that close (make) on contact. That's about it. Plug it in, replace the amplifier front panel, and fire it up.

Collins owners are a strange lot!

Collins 30S1 owners know full well that no ready light indication is incorporated in the amplifier design. That's a pain in the you know where, especially if you're in a sudden hurry to

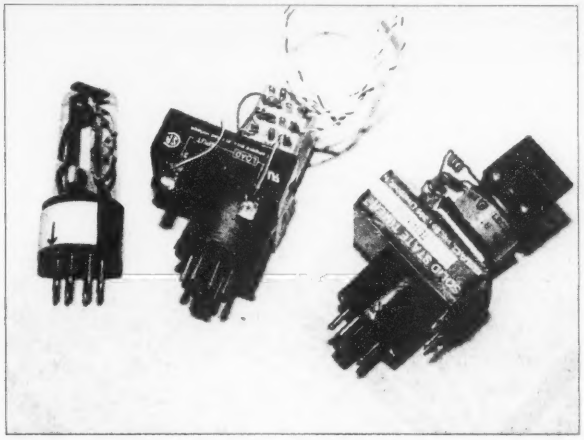

***Photo E.** A view of the now defunct timer delay tube along with two almost similar versions of its replacement. A careful look at the base of the tube will reveal how worn the tube was after years of service. The indexing pin had long ago broken off and the label and arrow helped to position it correctly in the socket. The modules are identical in design except that one relay is enclosed and the other is an open frame. The module to the left clearly indicates the input and load terminals described in the text. The solid state module will only control a 120 VAC relay.*

chase some DX and you don't have a stopwatch to time the delay. All you can do is continue to push the high voltage button until the circuit kicks in.

Obviously, there's got to be a better way. Since it would be considered sacrilegious to drill a hole in the amp and install some kind of green-for-go pilot light, that option is out. However, remember that we just installed an outboard relay on top of the timer module, so if you elected to use a DPST unit, you'd have an extra set of contacts doing nothing for you after the delay has been satisfied and the relay closes.

Since drilling new holes in any piece of Collins gear is out of the question, here's an alternative that even the die-hard Collins owner can accept without any recrimination. When powering up the amplifier, both the multimeter and the plate and tuning dial lights are instantly on. Consider cutting the wire from the low voltage power source to the two lights behind the plate and tune dials. Connect a pair of light gauge wires to the two cut ends and dress the sufficiently long length of wire back to the new relay. Solder the ends of this twisted pair across the unused set of normally open contacts at that point.

Again, make certain to leave the multimeter wiring intact so that it will continue to up light instantly upon power-up. The two bulbs behind the plate and antenna tune dials will remain dark until the 3-minute delay has been satisfied. When the relay kicks in to close the interlock circuit, the dial lights will simultaneously fire up and you're good to go without a wasted moment.

Continued on page 44

Parts Suppliers

Part	Part #	Price	Source
Solid state time delay relay (115 VAC 180 sec. delay timer 1 A load)	650-0013	$1.00	Mendelson Electronics Co. Tel. (800) 344-4465
Solid state time delay relay (115 VAC 150 sec. delay timer 10 A load)	660-0071	$2.50	
SPDT 115 VAC relay	480-1984	$1.95	
DPDT 115 VAC relay	275-217	$6.99	Radio Shack
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Isotron Notes

Simple tips straight from the Hart.

Thomas M. Hart AD1B
54 Hermaine Avenue
Dedham MA 02026

Two years ago, I purchased an Isotron antenna from the Bilal Company for 20 meter portable work. After placing the unit on a pole and finding that it does an amazing job for such a small unit, I decided to experiment a little.

I have had very good luck using a 1/4 wavelength wire radial on my 2 meter walkie. Tests with local hams indicated a big increase in my signal strength with the radial in place. It seems to me that there was even a commercial version of the add-on radial on the market at one point.

The 20 meter Isotron, on top of a 10-foot temporary pole, was my next target for a "tail." I used the 1/2 wave dipole formula as follows:

(468/14.2) = 33 feet
(33 feet) times (105%) divided by (2) = 17.3 feet

The goal of my computations was to determine 1/2 wavelength, increase that by 5% (the usual increase for radials), and divide the product by two for 1/4 wavelength radials.

Using some Radio Shack plastic-coated braided wire for ease of winding and storing, I added a radial to the Isotron at the point where the U-bracket connects to the grounded part of the antenna. The radial simply runs in a convenient direction—away from the antenna.

Results: I can only offer experience, not actual measurements. During CW operations on the Scandinavian CW DX contest one year, I increased my contact rate by 100% after adding the radial. While I would like to believe that my rapidly improving contesting skills were the only reason, I have to believe that the radial played a part, too.

You might want to investigate this project and find a way to fine tune the radial for best results.

The ten-foot pole: portable antenna support

I have an MFJ 20 meter SSB/CW rig that I use for portable QRP operations

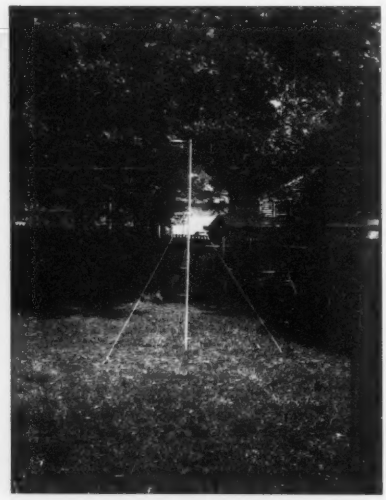

Photo A. *Ten-foot pole in action.*

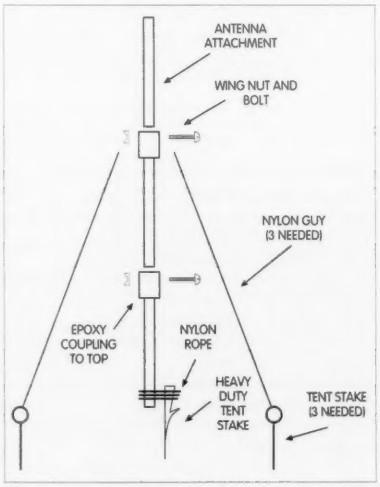

Fig. 1. *AD1B ten-foot pole.*

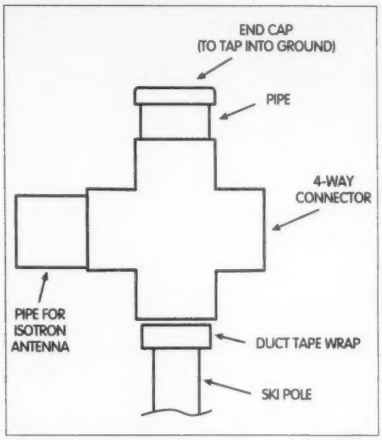

Fig. 2. Ski-pole mast.

in conjunction with an Isotron antenna. The need for an antenna support led me to design and build a ten-foot pole for hamming away from home. The support is made from two-inch-diameter PVC pipe cut into three sections for easy transport. Each section has a coupling epoxied to the end that allows attachment of the next piece. Ground fastenings are four tent stakes—a large stake at the base and three smaller ones for the nylon guy wires.

The dimensions are not critical—The whole design can be modified as needed. But it is very handy and makes a compact package when disassembled and wrapped up.

Photo B. Ski-pole mast.

Isotron mast for portable operations

While taking my afternoon jog around the neighborhood last year, I spotted an old ski pole in the trash waiting for pickup. What a great base for my Isotron antenna, I thought.

I grabbed the ski pole from the trash barrel and continued my running, headphone stereo in one hand and ski pole in the other. Several neighbors called my wife to ask if there was a good reason that I was jogging along with a "spear" or if I had simply lost my mind. No, oxygen deprivation was not the culprit. I had had an inspiration!

I removed the handle and basket from the pole. A wrap of duct tape at the top of the pole increased the diameter enough to fit inside a 2-inch PVC pipe assembly used to hold the antenna on top of the "mast."

This thing works—I used it on a February school vacation trip to Maine and made a number of contacts on 20 meter QRP with my MFJ rig. The whole thing is very simple and cheap. In fact, you can get your own ski pole the next time the trash barrels are out at the curb waiting for the truck. 73

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Basic Transceiver Tester

This fancy spin on some common components is a good beginner's project.

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Have you ever sent a radio in for repair, only to find out you could have fixed the problem yourself? With these simple ideas, you can save some time, money, and embarrassment.

The microphone tester will check your PTT as well as the element itself. The PTT is simply hooked in series with an LED and current-limiting resistor. When you push the PTT, the LED will light; if not, you have either a bad switch or an open in the cable. A bad cable will be indicated by a flickering LED (it flickers in sync with the movement of the cable). Typically, cables go bad at the major stress points — the connector at the radio, the strain relief at the microphone, or wherever it got caught in your car door.

The audio amplifier is a commonly available 1/2-watt amplifier IC found at Radio Shack. With even a modest communications-class speaker, I found a half watt to be more than adequate in output power. The main thing to remember, especially if you're going to use the amplifier for other experiments in the ham shack, is to buy a log potentiometer. I bought an on/off switch that I mounted to the rear of the potentiometer; this way, I could turn off this section of the tester when not in use, as well as make certain I'd start at minimum volume every time to avoid unexpected surprises.

While talking into the microphone in a normal speaking voice, adjust the volume for a comfortable listening level (avoiding the high volumes that would cause feedback). By flexing the microphone cable, it readily becomes obvious if there are any intermittents in the cable.

The transmitter tester is also in two sections, which can operate independently of each other. If S1 is left off, S2 will toggle the radio into transmit without having to use a rubber band around the microphone's PTT (or some other inconvenient method). This

Photo A. *The final version of the radio tester. The switch on the far left is the power switch; S1 and S2 on the schematic have been combined to a center-off switch (3P3T). The speaker jack is on the side; cable to the transceiver comes out the rear, with the power cable.*

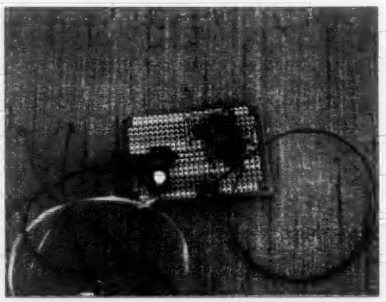

Photo B. *The actual circuit (audio amp still to be plugged in — that was done in final assembly).*

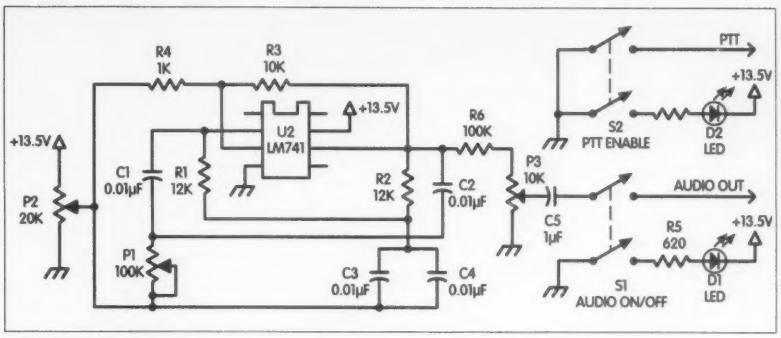

Fig. 1. Transmitter tester. Unlabeled resistor near S2 is R7, 620 ohms.

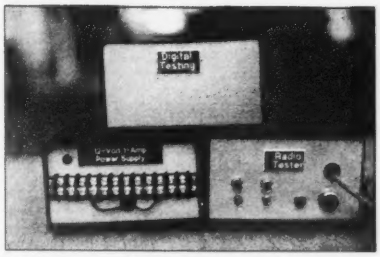

Photo C. A brief demonstration of the "mix 'n' match" station accessories I'm building (the digital tester is still under construction).

will allow both hands to be free to do whatever knob turning, instrument reading, schematic chasing, etc., that's required. Just don't forget a suitable dummy load on the antenna! Again, I use the ever-convenient LED as a status indicator — especially important here — so finals don't get fried (as in, "Oops, guess what I forgot to turn off?!"). Once S1 gets turned on, audio is injected into the radio via the microphone connector (replacing the microphone with the cable from this tester).

The audio oscillator has been modified from a circuit on page 47 of a book published by Radio Shack, *Engineer's Mini-Notebook* by Forrest M. Mims III. First, I modified the circuit to allow single-supply operation via P2. Then I added a volume control. During my initial experiments, P2 consisted of two 10k fixed resistors. When I noticed that the circuit operated nearly rail-to-rail (when P1 is adjusted to make the circuit oscillate), I noticed slight clipping on the bottom of the waveform. This was caused by the two 10k resistors not being totally identical (I'm using 5% tolerance components). To save money by not buying 1% resistors, I used a 20k potentiometer instead and adjusted it for exactly 1/2 of my supply voltage. By backing off slightly on P1, I could drop the output voltage slightly as well, so the amplifier isn't driven quite as hard.

Continued on page 44

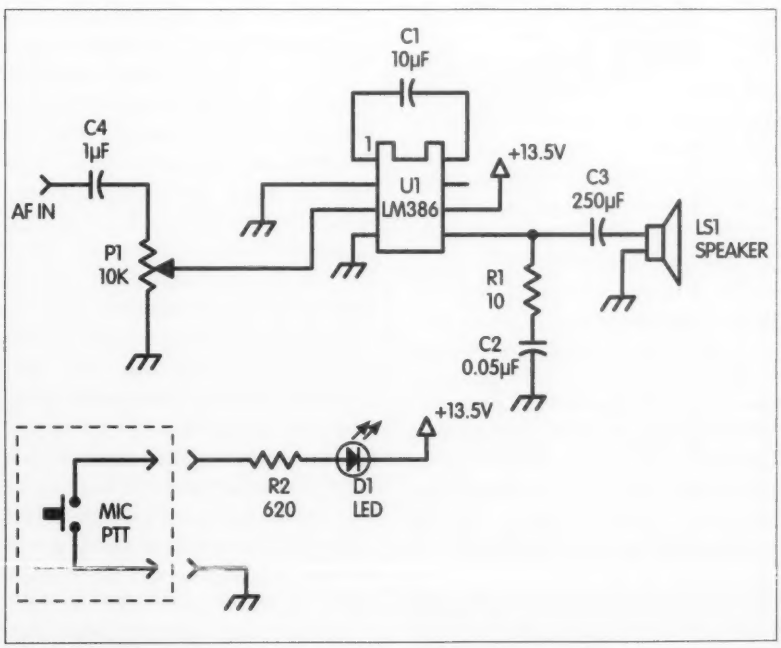

Fig. 2. Microphone tester.

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[AFDEK1@UAA.ALASKA.EDU]

Ham radio operators work with lead-acid battery strings, many without fully understanding all of the requirements for proper maintenance practice. Further, many hams will similarly perform maintenance on larger battery strings, such as those found in solar power plants or small hydro-powered systems — if not for themselves, then for their friends — and be subject to the same knowledge shortfall. Let's see if we can do a little enlightening.

I will start by identifying several types of lead-acid batteries that may be found in your station or solar plant, and then describe how to perform maintenance and tests on the battery. Standards exist within the power industry; I give you an example of these maintenance practices at the end of this article. You can take this information and see how it may fit into your specific station.

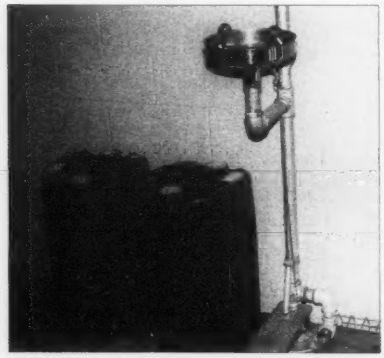


Photo A. *Safety first! In commercial sites, a water shower is installed. You should have a ready source of water when you work on batteries.*

One of the most common types of cell used in a station battery string is the "flooded cell." Often seen in solar power plants, electric golf carts, or as part of Uninterruptible Power Supplies (UPS), they can be considered a large capacity unit and contain significant amounts of free electrolyte. Be sure to check the battery Material Safety Data Sheet or technical specification sheet to find design voltage and internal loading. If you don't have this data, you can use the Internet to find the battery manufacturer — most have very informative Web sites. I have easily obtained this type of information within hours of starting a search, with the manufacturer most willing to Fax the information to the shack.

While the flooded cell is generally forgiving in terms of charge and discharge, it does present some well-known problems. There is a risk of sulfuric acid spills, and the process of charging batteries can generate explosive amounts of hydrogen gas. Before you start on any maintenance, be sure you have the proper Personal Protective Equipment (PPE) and understand basic safety precautions. Insulated tools should be used to perform any maintenance on your battery plant.

Start work with a close visual inspection. The larger cells typically found in solar plants have vented caps to allow any gas to escape, while blocking sparks from reaching the internal portion of the cell. These caps require periodic inspection and, possibly, cleaning. Generally, a soaking in distilled water is all that is needed.

Sporadic maintenance or poor installation practices may cause the inter-cell connections to overheat or even cause the battery post(s) to melt down. Both of these conditions can lead to a short — resulting in a runaway condition that could cause a fire. Careful cleaning and a check on the torque of the link bolts should be performed annually. Most inter-cell links are covered with an anti-corrosive compound. You must remove and clean the link.

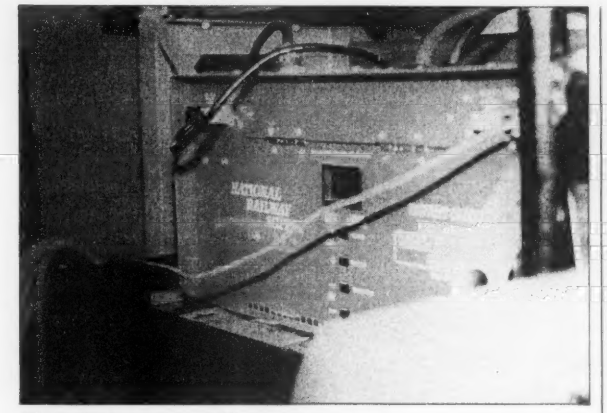


***Photo B.** A commercial battery tester.*

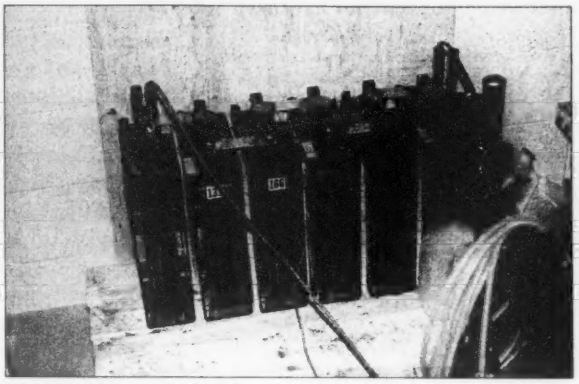


***Photo C.** Don't try this at home! A set of batteries under test load in a commercial site.*

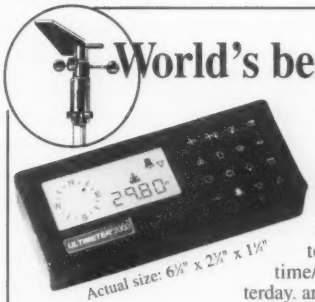
Next comes a close check for signs of heating or loss of link mass due to corrosion. Replace questionable links immediately! The battery must be removed from service to work on inter-cell connections — safety first!

Have you ever heard this: "We don't need to worry about those batteries — they're maintenance-free and leakproof to boot!" The person here may be referring to a VRLA or Valve-Regulated Lead-Acid battery. They could also be referring to a "gel-cell" or gelled electrolyte battery, or possibly an Absorbed Glass Mat (AGM) battery or absorbed electrolyte battery. These common and dangerously erroneous assumptions about maintenance requirements and leakage could lead to a disaster.

All of these VRLA battery types feature a sealed case; however, the physics of how each battery functions are significantly different. Valve-regulated batteries are a type of sealed battery that, as the name implies, regulate the venting of excess hydrogen gas through a one-way valve or vent. VRLA batteries are often called "captured electrolyte" or "capture mat" batteries, or they may sometimes be called "recombination" batteries. These names indicate the internal physics of the battery, while the terms "vented" and "valve-regulated" specifically refer to the mechanical device allowing the battery to vent excess gas.

VRLA batteries can contain significant amounts of sulfuric acid, and they do vent explosive hydrogen gas. Worse yet, they are *very* sensitive to temperature and charge rate. If overcharged, VRLA batteries can go into internal thermal runaway and explode violently. I have seen the results of these battery explosions — they have the power of a bomb. If that isn't enough, some case swelling is considered "normal," though excessive case swelling will indicate trouble. All this can be confusing — suspect batteries or battery plants should be inspected by a professional battery technician.

Next on the list are "gel-cell" batteries. These are a sealed case type of battery that recombine the hydrogen formed in the recharging process with free oxygen to form water which, in turn, keeps the cell "wet," or hydrated. The term "maintenance-free" was



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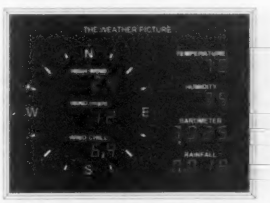

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coined by battery manufacturers in order to market recombination-type batteries. Don't be fooled! These still require some regular maintenance

Batteries touted as maintenance-free are, in reality, "reduced maintenance batteries." It is not necessary to routinely monitor the hydration of these batteries as with the traditional flooded cells. These batteries should be inspected regularly for signs of stress. Two of the most reliable indicators of battery health are regular inter-cell resistance measurements and cell temperature measurements. All types of sealed batteries require careful charging and pose an explosion hazard. Maintenance of these systems will require a check of the temperature sensors that are part of any professional charging system. Do not exchange battery chargers without ensuring that the new unit is compatible with your sealed battery plant.

***Photo D.** These batteries have a flame arrestor vent cap, and access for a thermometer.*

While the battery plant is off-line during maintenance, perform a voltage check on each cell. Record this for later use. You should track cell-to-cell impedance or internal resistance. This is the real limiting factor in your battery plant's charge and discharge current rate. You will need a load, a pair of accurate volt-ampere meters, hydrometer, thermometer, and safety equipment.

Begin by taking the battery string off-line; let it sit for at least two hours. While this "settling" period is started, you can carefully clean the "jar" or case of the battery. Wear gloves, apron, and safety goggles! Use a clean cloth soaked in clear (distilled is best) water. Remove all signs of corrosion and dirt. A small amount of soda may be used for stubborn areas. Remove inter-cell links and soak in soda water. Clean the links and check for pitting or loss of mass. If you find any, it is a good sign the battery cell may be contaminated. Replace any links that have lost any mass or are heavily pitted.

Clean and inspect the cell posts carefully — use a flashlight if you are not in bright light. If you are fortunate to have glass cells, visually check the bottom of the cell for buildup of scale from the plates. If this scale contacts the plates, failure is certain. Remove the cell from service and dispose of it legally. See my article in the June 1994 issue for more detail on legal disposal.

By now, the battery will have settled. Take the electrolyte temperature and

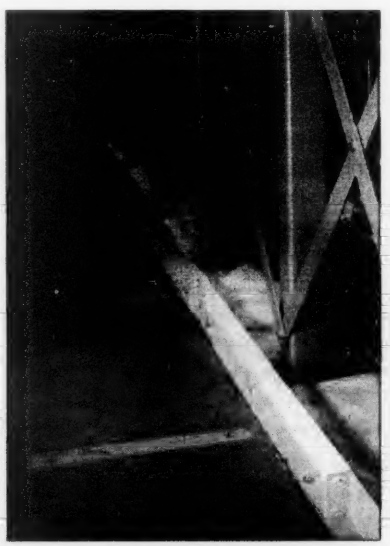

***Photo E.** These batteries have a spill pan and acid neutralized material on the floor. If you have a large system, this may be a local requirement — be sure to check!*

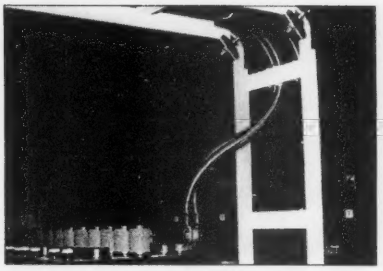

***Photo F.** A large, well-installed battery bank had the feed cables braced.*

record the reading. Now, remove the cell vent caps, take the hydrometer, and pull a sample. The specific-gravity–to–state-of-charge figures will be outlined in your Material Safety Data Sheet. Wear all safety equipment while performing this test. If you do it quarterly, you will be able to discover any cells before they go bad. The next action to take is a load test.

A word of caution here — DO NOT perform a load test on "capture map" or "starved electrolyte" batteries. These cells might be ruined by excessive loads used in this test. Worse, you might start a thermal runaway with disastrous results — so let's leave these types to the professionals.

A load test on a wet or flooded cell battery is no problem. First, set your voltmeter to read the unloaded cell voltage. Then, set a shunt to read the current pulled in the test. So now you have an ammeter shunt to read current, and a voltmeter to read loaded voltage. The next step is to attach your load. I use a huge military surplus rheostat — you can use an auto headlamp with both elements wired to provide a load. I increase the load until the battery voltage drop stops and then becomes steady, and then I quickly remove the load. Be careful — lots of heat can be generated. Simple math and Ohm's law will reveal the inter-cell impedance; write it down. Should this reading increase, your cell may be nearing the end of its useful life. If this seems like too much trouble, garages use a commercial unit to perform these types of load tests. Used units may be available, so it might prove beneficial to call around.

When you're finished, assemble the cells into a battery. The use of nonconductive grease such as No-Ox will go a long way to save time and money in the future. Hopefully, this article will give you at least some of the information you need to keep your battery plant humming along and your station on the air, no matter what. With Y2K around the corner, be sure to get your maintenance done now!

What more data?

Check out these sites:

[http://www.usbr.gov/power/data/fist_pub.htm] — maintenance practice standards.

[http://members.aol.com/bmmsuk/cellcord.htm] — commercial testing equipment.

[http://www.measurebetter.com/products/batacti.htm] — battery tester.

[http://www.avointl.com/products/battery/] — more battery test information.

[http://www.radco.thomasregister.com/olc/radco/radco3a.htm] — automotive battery tester.

Please: Be sure to use common sense and practice safety first. If you don't know what you are doing, take the time to read about battery maintenance. Batteries may appear to be a simple type of older technology, but they can kill you.

Enjoy life off the grid in a safe and sane manner. You may contact me via the E-mail address at top if you like. 73, N7MGT.

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A Big Look at Small Wonders' WM-20

This SSB transceiver kit is fun to build and works well.

Jeff M. Gold AC4HF
1751 Dry Creek Rd.
Cookeville TN 38501

I have built many of the transceiver kits on the market. Although I operate mostly CW, I also enjoy working SSB. When I saw the Small Wonders SSB kit, it immediately got my attention. You can purchase the kit with the board and all the on-board parts, or with the optional enclosure kit that includes an extrusion enclosure, 10-turn potentiometer for tuning, on-board frequency counter, connectors, knobs, and controls. The board is only 4.4" x 5.25". The case is not much bigger. The finished product is extremely small and light. This is a very good project for a builder who has experience building kits. The WM-20 board kit costs $100. The enclosure is an additional $60. The kit is available for 40 meters (WM-40) and 75 meters (WM-75). The builder will need to supply an HT speaker/mike. The WM series is designed to be used with the Yaesu MHW-12AB, ICOM M-54, MFJ-284, and Radio Shack HT speaker/mikes. I tested mine with the MFJ-284 and a very old ICOM speaker/mike. I could not detect any difference either on transmit or receive between the two.

The board is a good-quality double-sided printed circuit board. It is quite easy to solder on. The drawback is that with this type of board, it is not easy to unsolder components. If you are careful and follow the directions, this should not present any problem. The only time I ended up desoldering was once I had completed the project and experimented with the transmit section. I used a solder sucker and some desoldering braid. I took my time and did not have a problem.

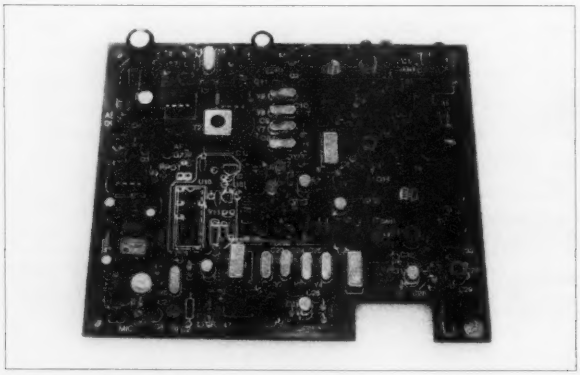

Photo A. *The PC board.*

The parts on the board are densely packed. Some of the parts overlays use the value of the components and some use the part numbers. This is not a problem, but I suggest caution in making sure the correct part gets placed in the proper spot on the board. I used meters and measured all resistors. I also sorted out all the capacitors before I started. I take a sheet of blank 8.5" x 11" paper, stick the capacitor legs through the sheet, and label the values. This makes the building phase much smoother.

I take a few plastic parts trays and sort out the resistors in bunches that are small enough that I can take out my magnifying glass and pick the correct colors. Some builders will sort all the resistors in the same way I sort out the capacitors. I hate spending time doing it this way, and find that if I separate them out this way, I can easily pull the correct resistor while I am building.

The manual is a professional-looking document that has a large parts layout, the parts lists, troubleshooting schematics, a list of things to do before you build, and directions. The manual starts with a circuit description. Dave Benson NN1G designed the rig more for performance than small parts counts. The receiver uses a low-gain j309 RF preamp, diode-ring mixer, and

mixer post-amp. The receiver has automatic gain control. The transmitter chain also uses diode-ring mixers for good carrier suppression and RF stability. There is minimal sharing of transmit and receive circuitry. The manual gives a nice circuit description. The actual building instructions start with general guidelines, such as how to put the diodes in the board with correct polarity, how to install IC sockets, and how to wind toroids.

The kit was designed to be built and tested by functional sections. I appreciated the build-by-section approach. Dave has divided the project up into seven groups. He starts off each section with a blowup of where the section you will be building is on the board. The best part is checking each section before proceeding to the next one. This makes it a lot easier to find any problems as you go along. You build the transmit/receive switching section first. Next you complete the receiver "back end." The next section is the local oscillator and buffer. When you finish the fourth section, you have completed the receiver. The fifth section is the SSB generator circuitry, followed by the 14 MHz driver circuitry. The last section is the final transmitter section. Dave includes a small packet of test circuitry to check some of the sections. This consists of PC board material and some diodes and .01 capacitors. It was fun to build up the little board. This is done on the PC board directly and you build from a schematic. It is a simple circuit and worked well. I checked each section according to the directions and most came up right away in the manner described.

I only encountered one discrepancy with my testing. When checking the local oscillator frequency I found the frequency to be too low. Dave covers this in the manual. As suggested, I removed one turn off L3 to lower the frequency, and then used the trimmer capacitor (C16) to get me right on frequency.

My adjustments for the local oscillator were made easier by the fact that I had purchased the enclosure kit. The kit comes with frequency counter circuitry that installs on the main board. Once these parts are installed, you can temporarily put a jumper (provided with kit) across the "SPOT" header pins. Then, with a speaker attached, you will hear a 3-digit series of Morse code characters. These will be the kHz value of the transceiver frequency. For example, if you hear "212" in Morse, it will represent 14.212 kHz.

The alignment of the transceiver is pretty straightforward. First you align the local oscillator (LO) using the trimmer capacitor. It is easier if you have an external frequency counter or the counter circuitry installed. If not, you can adjust the LO by transmitting into a dummy load and using a calibrated stations receiver. To adjust the receiver, you just peak one IF transformer for maximum hiss. This adjustment was very sharp and easy to do with my kit. Then you tweak two trimmer capacitors (C3, C4) for maximum hiss at the speaker. These weren't as sharp a peak as the IF. There is one

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adjustable on-board resistor to adjust the AGC action. You do this by adjusting the resistor for a comfortable maximum audio output while listening to a strong on-the-air signal.

To align the transmitter, you install a test jumper and, while hooked to a dummy load, adjust two more trimmer capacitors for maximum CW power (C29, C21). The best way to do this is using a QRP wattmeter. Next, remove the test jumper and adjust the TX offset by adjusting a trimmer capacitor (C21) for the most natural voice sound, while listening on a station receiver. The manual suggests using a set of headphones on the station receiver so that you can really hear what is going on. The last adjustment is the mike gain trimpot, which you adjust for maximum gain without distortion. I found the whole process to be quick and straightforward.

The only problem I encountered with the entire kit is that with the test jumper installed, I can only get about 1.5 watts CW power out using about 13 volts. I get about 1 watt out using a 12 volt gel cell. All the external controls attach to the board with plugs that slide onto board jumpers. This makes it very easy to put the final controls on and do adjustments and modifications.

When I had the rig about finished, but not in the case and not through a final alignment, I decided to bring it over to my operating bench and hook it up. I placed a piece of paper on top of the metal cover of the tuner it would be sitting on top of in order to prevent shorting of the power. I hooked up the antenna, speaker/mike, and a 12 V gel-cell. The rig came to life instantly. I pressed the "SPOT" button to hear what frequency I was on. I tuned around and found the receiver to be working well. I heard a station just signing off. Using an old technique I employ, I waited until both hams had just signed off and a bit more to make sure the frequency wasn't being used. I then asked if the frequency was in use. I did this several times. The other ham came back to me and told me to go ahead. This was really exciting. I was getting out and could be heard and understood! Still feeling very excited, I gave out my callsign. He came back to me and said my signal was weak, but we exchanged information successfully. Later, I put the case together. This is simply a matter of sliding the board onto rails in the case and attaching the front and rear panels with four screws.

Once I got the kit completed, I waited to have some time to test it out. The next Saturday provided me the opportunity. There was a big international contest on the air. I don't keep track of them, so not sure which one it was. The 20 meter band wasn't great, but it wasn't too bad either. I tuned around for loud signal. I heard a US station and gave him a call. He came back to me.

I had to repeat my information a few times, but completed the contact. I made four more US contacts. That night I got on and heard a station from Hungary. I needed to repeat my call and information a few times, but completed the call.

The front panel layout of the case has a set of mike/speaker jacks, an AF gain control, a spot push-button for the frequency counter, and a tune knob. The back has a BNC antenna connector and the power jack. I wanted to be able to leave the rig attached to the battery and still be able to turn the power on and off. I did not have a replacement 10k pot with an on/off switch, which would have been my first choice, so I installed a small toggle switch on the rear panel. There was plenty of room on the back panel. I simply drilled a hole and cut the power cord inside the rig.

The entire rig is *very* small and lightweight. It was fun to build and works well. Besides the addition of the on/off power switch,

I would personally like to see a bit more power. I am able to make contacts under good conditions, but the power is just a bit low for reliable use. I believe that in order to keep the rig so small, Dave had some design constraints. I usually like to work as little power as possible.

On CW you can use *very* little power and still make plenty of contacts. I have found that you need a bit more power on SSB to get through.

To test how much difference a few more watts will make in my ability to make contacts,

I am going to do something I have not done before: My next project is going to be to build an amplifier to get the power up to about 8 watts or so.

Specifications

- IF: 9.83 MHz (75m or 40m), 8.00 MHz (20m)
- Tx/Rx crystal filters: 2.3 kHz BW
- Receiver MDS: –128 dBm (0.1 µV)
- Two-tone dynamic range: 90 dB
- Image rejection: 70 dB
- Frequency coverage: 180 kHz nominal (20m, 75m)
- Cold start drift (typ.): 300 Hz
- Transmitter power out: 3–4 W PEP
- Carrier suppression –40 dB: no adjustment required
- Transmitter harmonics/spurs: –45 dBc
- Transmitter IMD3 (2-tone): –36 dB PEP (@ 3W PEP)
- Power requirements: 12–14 VDC @ 120mA (receive), 1A peak (tx)

For further information about this product, contact Small Wonders Labs, Dave Benson NN1G, 80 East Robbins Ave., Newington CT 06111. E-mail: [dave@smallwonderlabs.com]. 73

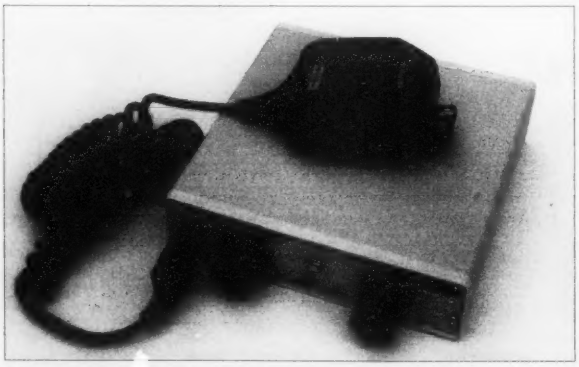

Photo B. *The finished WM-20 SSB transceiver.*

No Bum Steer

Maximize your loop's performance the easy way.

Howard Shepherd W6US
P.O. Box 607
Mc Arthur CA 96056-0607

The full wavelength horizontal square loop has received good marks from the amateur radio fraternity. When fed with a high quality open wire transmission line, it is an excellent performer, capable of multiband operation (see Notes 1 and 2).

An 80 meter loop gives very good DX on the higher frequency bands, exhibiting gains comparable to yagi arrays. It does exhibit two lobes on its fundamental and an increasingly larger number of lobes and associated nulls as higher multiple frequencies are used.

Quite often, due to physical layout limitations, such lobe and null structure greatly limits good QSOs in desired directions. This article offers a means whereby alternate lobe and null directions can be easily obtained by "steering," regardless of the original physical orientation of the loop.

In approaching this subject, the usual caveats apply — namely the effects of ground topography and the presence of nearby antennas and conducting structures, all of which will alter the azimuthal and elevation patterns described. This information was developed using computer-aided design methods, so because there may be program imperfections coupled with necessary assumptions, the results need to be classified as approximations (see Notes 3 and 4). Despite such warnings, the material presented is, as the saying goes, "good enough for government work."

Refer to **Fig. 1.** The data presented here is based on a full-wave horizontal square loop, resonant at 3.9 MHz. On 75/80 meters, such a loop exhibits a single elliptical lobe pattern with its signal maximums approximately 5 dB greater than its minimums when an elevation angle of 45 degrees is calculated. Obviously, 5 dB are very important on this band, so orientation of the loop becomes a major factor. When the horizontal polarization alone is examined, as distinguished from "total" radiation, the result of changing the feedpoint is much more dramatic, as shown in **Figs. 2** and **3.** The vertical polarization shows a similar pattern rotated by 90 degrees.

The purpose of this article is to suggest how an amateur who is restricted to a given orientation can still "steer" the azimuthal pattern of the loop to maximize the signal in his favored direction. When multiband operation is used, this becomes even more important, as the lobes are narrower and the nulls much deeper.

Fig. 1 depicts a plot plan of the loop. For convenience, and to provide a reference, it is assumed that the orientation is such that the axis A to C is from south to north. As shown, the initial feedpoint is at corner A. The wires are numbered 1 through 4 for convenience in calculation. In this arrangement, the radiation at the 45 degree elevation angle (equivalent to a QSO distance of about 700 miles) forms an ellipse with its maxima through the axis of A and

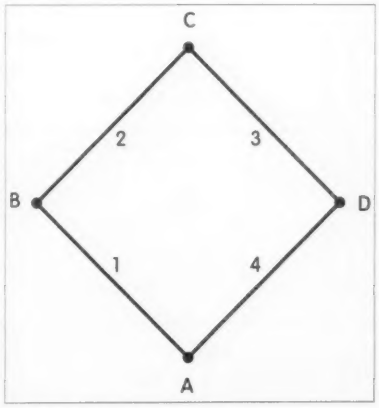

Fig. 1. A plot plan of the loop.

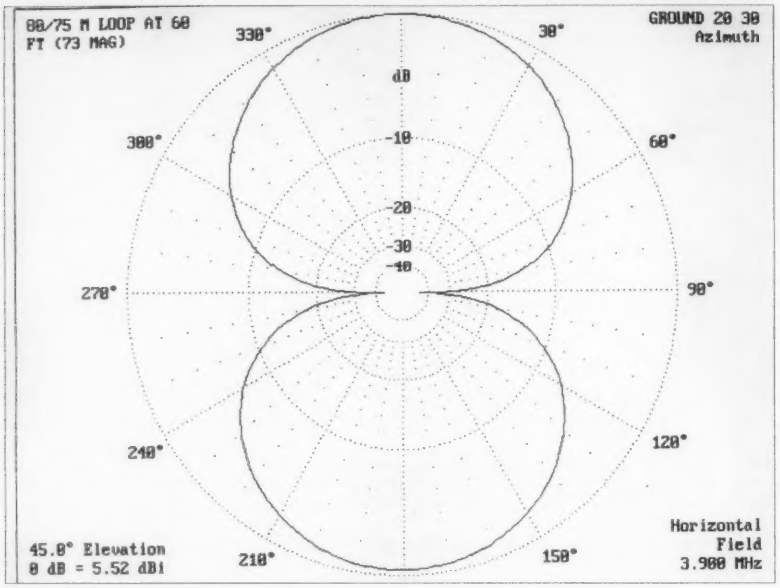

Fig. 2. Loop fed at A or C.

C, and its 5 dB down minima on the axis B to D. In applying this to your own installation you can ask yourself if such a pattern is best for your favored QSO azimuth.

If, for example, you would prefer to have your best distant signal on the B to D axis, this could be easily accomplished by moving the feedpoint to either corner B or D.

Table 1 shows how other intermediate azimuths can be selected by an appropriate choice of feedpoint. While it is true that the beamwidth of this loop on 75/80 meters is quite broad, the principle of "steering" the lobes becomes extremely important when multiband operation on higher frequency bands is contemplated. It does show the latitude of feedpoint selection so as to optimize feedline length while still maximizing the signal in the desired general direction. It should also be noted that placing the loop at different heights above the ground will not change the azimuth pattern, but will

Continued on page 44

Feedpoint	Max. Signal Azimuth (degrees)
A	90–270
25% from A to B	110–290
Center of wire #1	137–317
75% from A to B	160–340
B	0–180
25% from B to C	21–201
Center of wire #2	43–223
75% from B to C	68–248
C	90–270
25% from C to D	110–290
Center of wire #3	137–317
75% from C to D	160–340
D	0–180
25% from D to A	21–201
Center of wire #4	43–223
75% from D to A	68–248

Table 1. Other intermediate azimuths can be selected by an appropriate choice of feedpoint. (Refer to ***Fig. 1****.)*

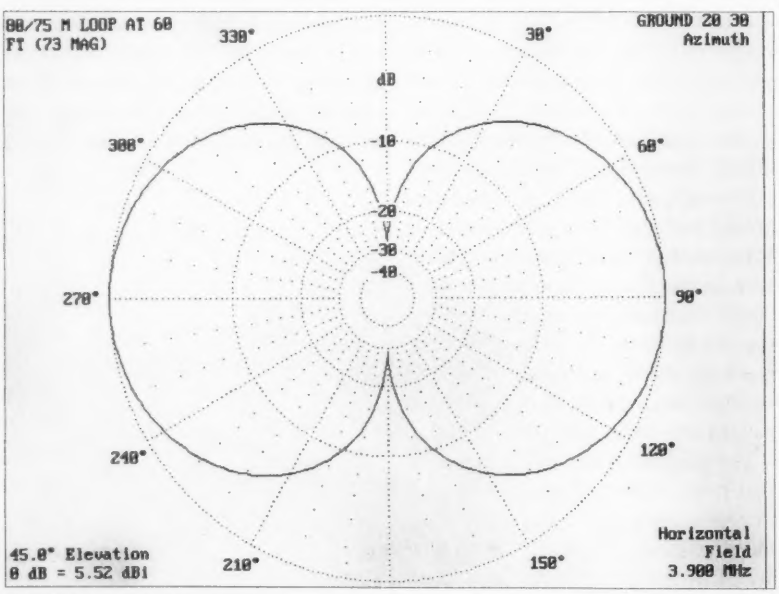

Fig. 3. Loop fed at B or D.

Feedpoint	Main Lobe Azimuth (degrees)	Null Azimuth (degrees)
A	0–90–180–270	57–125–235–308
25% from A to B	36–126–216–308	84–167–267–348
Center of wire #1	45–135–225–315	91–180–273–357
75% from A to B	54–142–234–322	102–183–283–6
B	0–90–180–270	147–214–324
25% from B to C	36–126–216–308	77–177–258–354
Center of wire #2	45–135–225–315	91–180–273–357
75% from B to C	54–142–234–322	102–183–283–6

Table 2. Repetition occurs when this 3.9 MHz loop is operated on 40 meters.

Secrets of Transmission Lines

Part 4: Traveling waves and some thought experiments.

John A. Kuecken KE2QJ
2 Round Trail Drive
Pittsford NY 14534

As we move into the area of transmission lines, we will be venturing into a somewhat different mode of circuit considerations. By and large, radios, televisions, and home appliances are made up of discrete components — capacitors, resistors, integrated circuits, and other neat little packages. All are items that can be described in some physical location and all are generally small with respect to the wavelength at which they are working.

Transmission lines are different in that they are described as items having "distributed parameters," meaning that they are not necessarily in one single location. Furthermore, their dimensions are frequently large with respect to the wavelength at which they are working. For this reason the signal properties often vary with the location along the line.

The most fundamental properties of transmission lines were developed in connection with telegraphy; therefore, the general descriptions are referred to as "Kelvin's Telegraphers' Equations." The telegraph was patented by Samuel F.B. Morse in 1840 and the first test line between Baltimore and Washington was constructed in 1843. Western Union was founded from 12 different telegraph companies in 1856, and by 1869 telegraph lines were extended across the continent.

There were three failed attempts to lay a transatlantic telegraph cable, and in 1858 a working cable was laid. It lasted only a few weeks before failing. Even without the electrical failure, the cable was a business failure because of the extreme slowness.

Signal strength was not a problem. The mirror galvanometer invented by William Thompson gave a more than adequate deflection. The problem was that at any significant sending speed, the characters muddled up with one another and became unreadable. It took more than an hour to send birthday greetings from Queen Victoria to President James Buchanan.

At the urging of Queen Victoria, Thompson was made engineer-in-charge of the cable project. His mathematical analysis led to the design of a cable with vastly improved electrical performance. In 1866, Cyrus Field organized another attempt using *The Great Eastern*, the largest ship then afloat. An improved cable connection was completed. This was both a technical and financial success, and Thompson was knighted by the queen

Continued on page 38

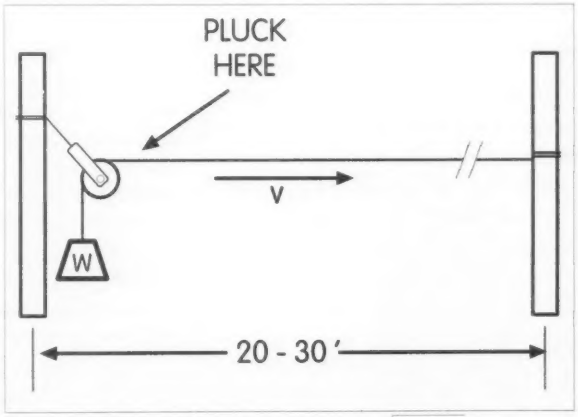

Fig. 1. *Traveling waves. Wave velocity is* $\sqrt{(T / W)}$ *meters/sec, where T = tension in newtons and W = mass of cord in kg/m.*

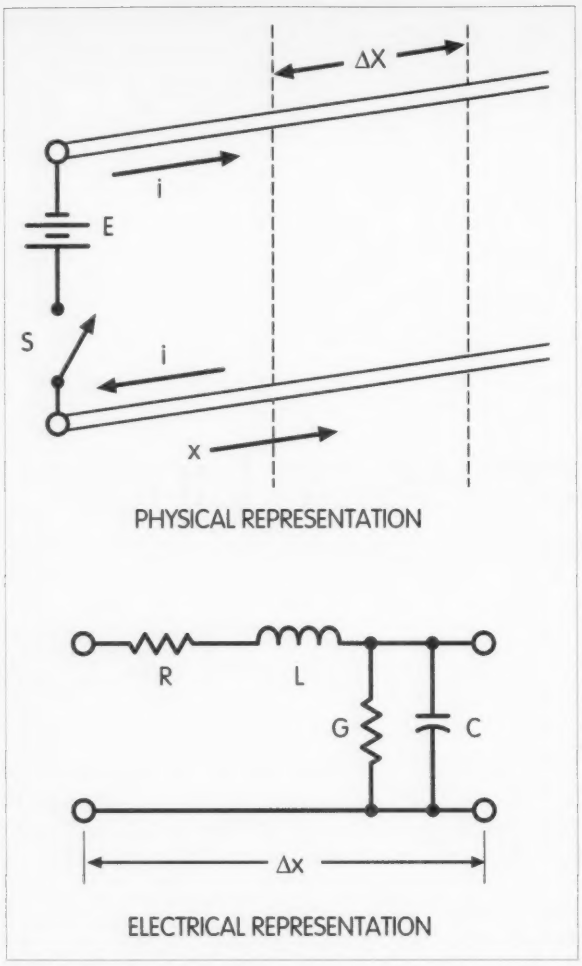

Fig. 2. Physical and electrical representations of an infinitely long electrical line consisting of two parallel conductors. R = resistance in ohms per unit length. L = inductance in henrys per unit length. G = conductance in siemens (reciprocal ohms) per unit length. C = capacitance in farads per unit length.

as Lord William Thompson Kelvin for his brilliant work.

A physical example

In order to give a physical "feel" to some of the work to follow, we will digress for a bit into a physical example. The illustration of **Fig. 1** shows the basic experiment. A cord is tied to a distant solid object and stretched over to another solid anchor point. A pulley is shown here, but it is not really necessary.

A weight is used to apply tension to the cord. The sort of cord used for traverse drapes or venetian blinds, woven cotton about 1/8-inch in diameter, is a good choice. For tension, we would like to have something on the order of 75 to 100 lbs. My auto toolbox weighs about 78 lbs. and worked fine. Support the weight on a box or something while tying the cord in place. Then remove the support and let the weight stretch the cord. Nylon cord does not work well because it stretches too easily. Regardless of the things you have available to anchor the cord to or how you obtain the necessary tension, I would strongly recommend that you actually perform the experiment rather than just read about it.

In the experiment, pluck the cord near the weighted end with a considerable displacement. When you let it go, you will see a "wave" or displacement go flying down the length of the cord to the far end. It will bounce or reflect off the far tree and come flying back to the weighted end, where it will again reflect and head for the far tree. You should be able to follow several transits. The first point is that the cord will sustain waves going both forward and backward. The second point is that the wave will reflect off of the ends of the cord, which are fixed in place and cannot move.

Next take a folded blanket or similar soft article like a sweater and drape it over the cord at the end opposite the pulley. In this case, we have given the wave a mechanism to absorb the wave energy and the reflection will be either absent or small. If an observer were unable to see the far end of the line, he would infer from the absence of a reflected wave that the line was infinitely long. We shall see the parallels to this in an electrical transmission line. If you wish to carry the experiment further, you could try different tensions and establish the fact that the wave velocity is proportional to the square root of the tension and inversely proportional to the mass of the cord.

Remove the damping from the cord and pluck the string in the center. In this case, you will see two waves go flying away; they will reflect off the ends and pass through one another in the center, thus demonstrating that two waves can pass through one another in opposite directions. This may also persist through several complete cycles. When you plucked the cord near the end, the wave portion reflected almost immediately and combined with what appeared to be the single outgoing wave.

Now electrical

Having physically seen some of the transmission line phenomena, let us now try to relate these observations to electrical transmission lines. The illustration of **Fig. 2** shows a physical picture of the line along with an electrical equivalent circuit of the line. In some segment of the line delta x, we have a resistance and inductance in series, and a conductance and a capacitance in shunt. The inductance is due to the magnetic field surrounding the wires following Ampere's law, and the capacitance is due to the electrostatic flux between the conductors. The series resistance is due to the fact that the wires are not perfect conductors, and the conductance is due to the fact that the space between the wires is not a perfect insulator.

Note that in order to charge the capacitor, the current must flow through the inductance and resistance. At this point in the treatment of Kelvin's Telegraphers' Equations, it is usual to branch off into partial differential equations and use a proof, which is actually simpler than the one used by Kelvin, because it uses tools not available to him at the time. However, for

the purposes of this series I am going to present only the significant results using an appeal to rational observation. For those with the desire to see a proof easily available to hams I can refer you to chapter 16 in my book *Antennas and Transmission Lines,* published by MFJ Publishing (#MFJ3305). There are also many academic references available.

Getting back to the example of **Fig. 2**, when we close the switch, what do you suppose happens? With a resistive circuit, we know that the relationship between the voltage and the current is determined by Ohm's law, but here we have an unending string of elements. And consider that even if the line is not infinitely long, it still takes some time for the current to flow from the battery end to the far end before the current can discover what the load or termination is. What determines the current in the mean time? If we simplify the matter by assuming that R and G are negligibly small, the answer to this question is given by:

$$i_f = \frac{E_f}{\sqrt{(L/C)}}$$

(4-1)

where
i_f = current in the forward wave
E_f = forward wave voltage

Note that both i_f and E_f can be functions of time. The period it takes the wave to make a round-trip transit of the line E_f in the example is equal to the battery voltage. The subscript f, meaning forward, is something we shall explain shortly.

The term $\sqrt{(L/C)}$ is called the characteristic or surge impedance of the line. It is measured in ohms. It is usually designated as Z_0 and sometimes referred to in speech as "Z naught." It is determined by the physical characteristics of the line.

For example, in the illustrated line of **Fig. 2**, if you were to leave the center-to-center spacing constant and decrease the diameter of the wires, the inductance per meter would increase, the capacitance per meter would decrease, and the characteristic impedance of the line would rise. If you were to leave the wire diameters constant and decrease the spacing, the capacitance would rise and the line characteristic impedance would fall.

This is the impedance that would be presented by a line that is infinitely long. If we remember what happened when we placed the blanket on the far end of the cord, it is also the impedance that would be presented if the line is terminated in a load resistor equal to the characteristic impedance. This resistor absorbs all the power in the forward wave so that there is no reflected wave. It is not possible to determine by electrical measurement the actual length of a line terminated in a resistor exactly equal to the characteristic impedance.

Velocity of propagation

If Z_0 is determined by L and C, it also seems logical that the velocity of propagation should be determined by these same parameters. As a matter of fact, the velocity is given by:

$$v = \frac{1}{\sqrt{(L*C)}} \text{ meters per second}$$

(4-2)

In free space, it is possible to separately measure the inductance per meter using current measurements, and the capacitance per meter using electrostatic measurements. The values are:

$\mu_0 = 4\pi * 10^{-7}$ henry per meter

and

$\varepsilon_0 = \frac{1}{36\pi} \times 10^{-9}$ farads per meter

These parameters are usually referred to in speech as mu naught and epsilon naught. If we insert these values into eqn (4-2), we obtain a velocity of $3*10^8$ meters per second, the velocity of light in free space.

In a similar fashion, if we insert the values into equation (4-1), we obtain a characteristic impedance of 377 ohms for free space. This determines the ratio of the electric field to the magnetic

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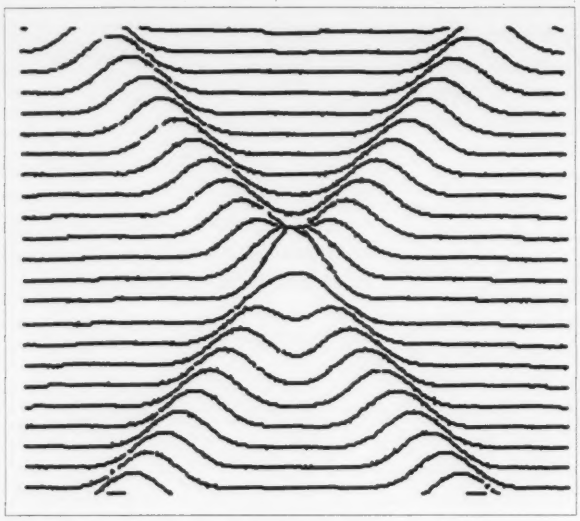

Fig. 3. Plot of the traveling waves: constructive addition.

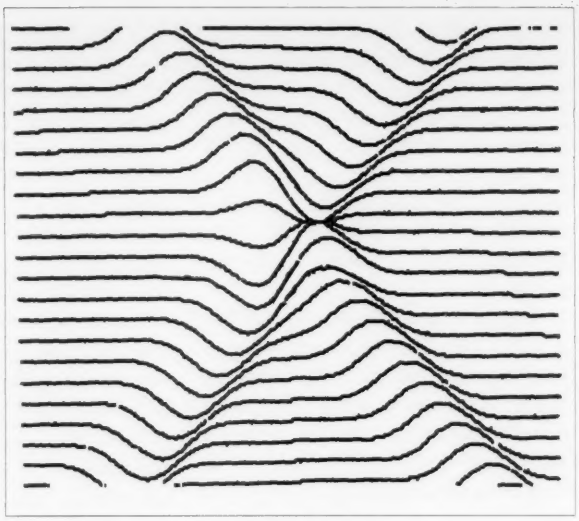

Fig. 4. Destructive addition of two waves.

field in an electromagnetic wave, be it light or radio propagating through a vacuum.

Forward and backward waves

As we saw from our cord experiment, it is usual to have both forward and backward waves on a transmission line. As a matter of fact the actual solution for the telegraphers' equation works out as follows for voltage and current at point x at time t:

$$E_x = E_f*[t - (x/v)] + E_b*[t + (x/v)] \quad (4\text{-}3)$$

$$i_x = (E_f/Z_o)*[t - (x/v)] + (E_b/Z_0)*[t + (x/v)] \quad (4\text{-}4)$$

If we use the normal convention that zero is at the left-hand edge of the paper and x increases going to the right, we can do a bit of interpreting of these equations. The term (x/v) describes a period of time. If the wave on the cord were traveling at a rate of v = 1 meter per second, then to travel to a point where x = 2 meters would take two seconds. Therefore, a point 2 meters to the right of the origin would be two seconds behind what was going on at the origin, and the total term [t - (x/v)] describes a wave going to the right. It follows that the term [t + (x/v)] describes a wave going to the left.

From this, the E_f is a forward wave going left to right, and E_b is a backward wave going right to left. Equation (4-4) could have been written with i_f and i_b. However, I elected to use the voltages and the line Z_0 to emphasize the fact that the current is determined by the voltage and Z_0.

A pictorial example

The illustrations of **Figs. 3** and **4** are intended to make the point about the forward and reverse waves visually. For our purposes, I have elected to use the Gauss Error Function for a wave shape. In this example:

$$E_f = E_b * \varepsilon^{(-t^2)}$$
where ε = natural log base = 2.7183 (4-5)

The Gauss Error Function has a single peak of amplitude one from minus to plus infinity, and it approximates a single cycle cut from a sine wave within a few percent between -2<t<2. Because of the single cycle, it is easier to follow than a sine wave, as we shall eventually see. It is a reasonable representation of the displacement wave in the cord if the cord is snapped out suddenly. The shape is easily seen in **Fig. 3**.

In **Fig. 3**, let us presume that we have plucked the cord in the center. Two waves flee to the ends and are reflected. The one on the left is going right and the one on the right is going left. You can view the successive traces going from top to bottom as separate frames of a movie. As an alternative, you can view the entire picture as a snapshot of two straight-fronted waves in a lake passing through one another at an angle. The latter view benefits from an optical illusion if you hold the book so that one of the wavefronts is nearly in the line of sight. You will note that the waves pass right through one another. At the instant that they cross, the amplitude is doubled, but before and after the crossing, they are unaltered.

In **Fig. 4**, the only change is the fact that the backward wave is reversed in sign; that is, it goes negative rather than positive. The interesting point here is the fact that when the waves cross, they completely cancel at one point, but emerge unscathed after the crossing. In fact, at any instant in time there is only one point that is zero; however, at the point where the deflection is zero, the transverse (up and down) velocity of the cord is maximum. The zero point slides through the two waves.

Conclusion

In the next part, we will amplify some of these concepts to develop the idea of the steady state conditions of the transmission line and the existence of standing waves. 73

The History of Ham Radio

Part 3: 1920–21.

By Eric G. Shalkhausser W9CI, SK

Amateur radio conventions and regional get-togethers back in the beginning 1920s were real festivities. The spirit which prevailed did so imbue all who attended that a broad new enthusiasm was born and dominated throughout amateur radio land in America.

Reference was made in our last installment to the 1920 grand finale convention in St. Louis. To prove that all the big-wigs, as well as hundreds of the hoi-polloi, were present, here is reproduced that convention's "Programme of Events."

It would be to the everlasting glory of the proverbial *Old Man* should any of the sparks of recording effort be transplanted into the pages of amateur history in the future. Probably nothing would surpass the account written in *QST*, February, 1921, pages 9 to 23.

For now, my notebook contains the following account of The American Radio Relay League Convention, as originally written and recorded in January, 1921:

"The Midwest Division of the American Radio Relay League held its convention in St. Louis, Missouri, December 28, 29, and 30, 1920. Representatives from all sections of the country were there, including all of the nine radio districts in the country. Never before in the history of the League has such a successful meeting in the interest of radio taken place. For three days old and young met, in most cases for the first time, although they had known each other for years.

"Hiram Percy Maxim, well-known scientist and inventor, and President of the League, opened the convention with an address. Mr. Stewart, our representative in Washington, outlined the legislative situation, pointing out how the Poindexter Bill recently introduced in Congress is threatening the

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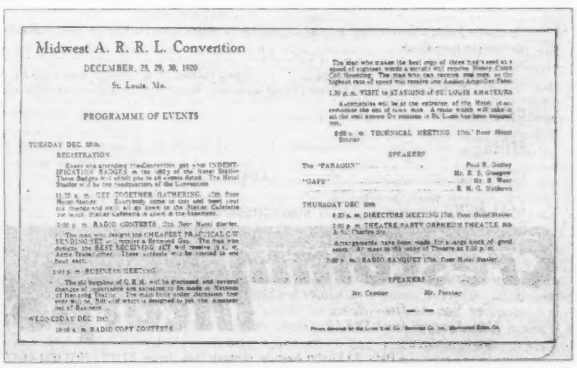
Reprinted from *73 Amateur Radio*, May 1977, where this was originally reprinted from *QCC News*, a publication of the Chicago Area Chapter of the QCWA.

***Photo A.** A display of early amateur radio memorabilia now at the Pioneer Village Museum in Minden NE.*



Midwest A. R. R. L. Convention

DECEMBER, 28, 29, 30, 1920

St. Louis, Mo.

PROGRAMME OF EVENTS

TUESDAY DEC. 28th.

REGISTRATION

1:30 p. m. GET TOGETHER GATHERING, 12th floor Hotel Statler.

8:00 p. m. RADIO CONTESTS 12th floor Hotel Statler.

SPEAKERS

The "PARAGON" ..... Paul R. Godley

"OAFS" ..... Mr. R. S. Greagor

..... Mr. B. Wear

..... R. M. G. Norberg

THURSDAY DEC 30th

8:30 a. m. DIRECTORS MEETING 17th floor Hotel Statler.

2:00 p. m. THEATRE PARTY ORPHEUM THEATRE 9th & N. Charles Sts.

8:00 p. m. RADIO BANQUET 17th floor Hotel Statler.

SPEAKERS

Mr. Conner Mr. Forster

***Photo B.** Midwest ARRL Convention Programme of Events, December 1920.*

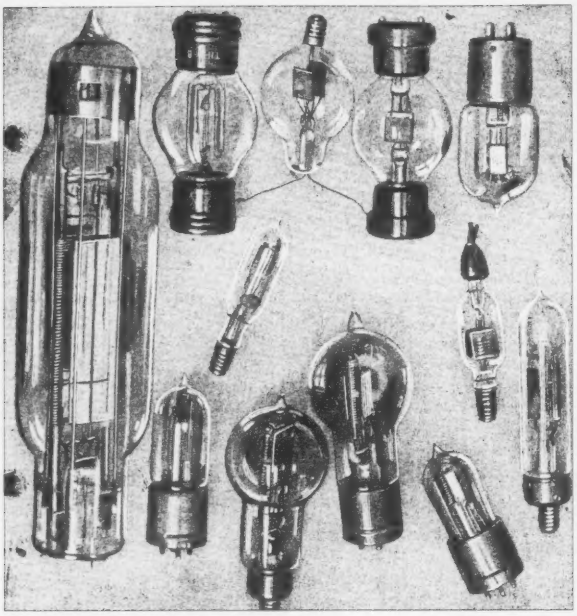


Photo C. *A selection of early vacuum tubes — a far cry from the ultra-miniature transistors and ICs of today.*

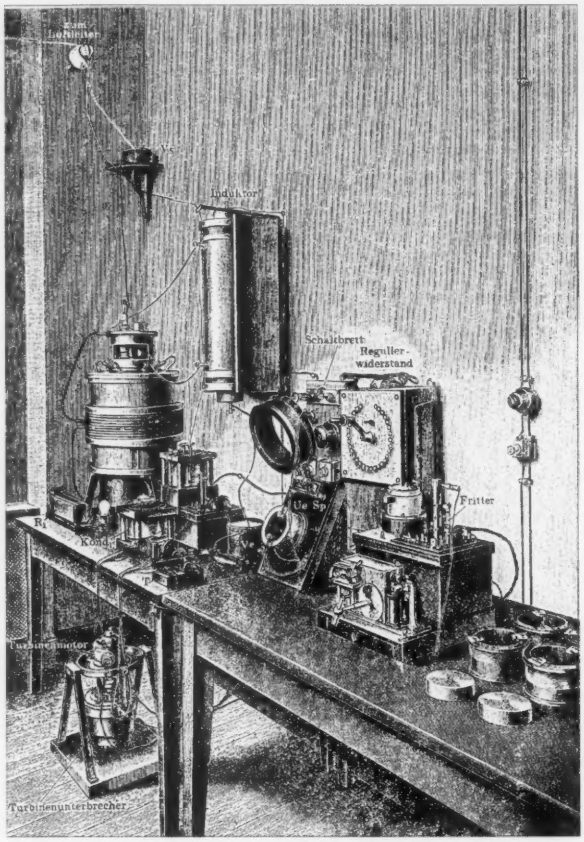


Photo E. *The "ideal" amateur station in 1920, consisting of one transmitter and two receivers. One receiver uses an electrolytic detector and telephone set. The transmitter utilizes a mercury interrupter and an open core transformer.*

existence of amateur radio operators and experimenters. A committee was appointed to draw up definite resolutions to be sent to Washington protesting against the passage of the bill. Mr. Warner, Secretary and Editor of *QST,* gave a resumé of our growth from its inception only a few years prior to the war up to the present time. He stated that membership of over 50,000 has placed the organization in a position where it ranks as one of the largest in the country.

"The technical meeting was held on the 27th. Among the listed speakers were Mr. B. West 8AEZ, naval radio aide and authority on spark dischargers; Mr. Paul R. Godley, chief designing engineer for The Radio Corporation of America; and Mr. R.H.G. Mathews, ninth district superintendent of the League. Topics discussed were in connection with apparatus used in amateur radio stations. Since all amateur stations in the country are restricted by law to operate on a wavelength not exceeding two hundred meters and an input not exceeding one kilowatt, it is essential that all energy put into a set be used to best advantage. The maximum efficiency can be obtained only when apparatus is designed accurately and with special attention to details. The realm of radio is still wide open to improvements with new discoveries continually being made.

"Perhaps of greatest interest was the short but spellbinding address given by Mr. Haddaway, a young man seventeen years old. This lad came from a poor family. As a high school freshman, he had to use his spare time to support the family. He gave us a description of how he made the 'moonshine bulb.' Despite various handicaps, he had built a complete and effective amateur radio station, located in a tiny closet in back of his mother's kitchen. How did he go about accomplishing an 'impossible feat'? Every piece of equipment, including the individual components, were meticulously fabricated out of anything and everything imaginable. Even the headphones and tiny vacuum tubes were homemade.

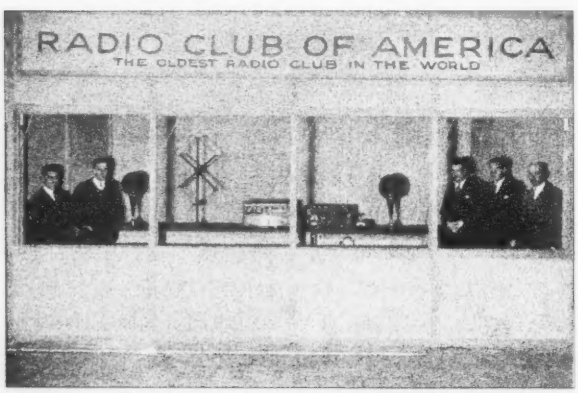


Photo D. *Public relations were as important in the early days of amateur radio as they are today. In 1922, a group from the Radio Club of America set up and manned this booth at a radio show in Grand Central Palace in New York City.*

He had located a wholesale drug firm discarding waste material and there found scraps of glass tubing, and bits of tungsten filaments from old lamps. With such parts, he made his vacuum tubes. He had built his own mercury pump to evacuate the tubes. He found the mercury from broken thermometers. His headphones were ingeniously fabricated from bits of wood, metal, and wire, but they performed beautifully. Everything else in his station, which was visited during the day, was very cleverly made and assembled. And his only financial expenditure was a 25 cent pair of combination pliers. I have met no one in my lifetime who has displayed such a passionate purpose to succeed.

"The climax of the convention was the radio banquet. To our knowledge, it was the first of its kind ever given in the history of the League. The spirit was there all right! What the St. Louis radio club did not think of was not worth considering. Even the menu savored of sparks and ozone, none of it, however, being charged to very high voltage. Mr. Chandler of 8NG fame, Mr. B. West, and the President, H. P. Maxim, gave short addresses. Bill Wood of the St. Louis club acted as toastmaster. To him as well as to the entire club is due the credit for the overwhelming success of the convention.

"The keynote of the meetings seemed to be *More Unity and More Cooperation* between the various clubs and organization as a whole, in order to be able to stand behind any move which the League attempts to undertake. Every city in the country should have an organized radio club affiliated with the League.

"The ARRL was organized with the intention of relaying messages from city to city, state to state, and ultimately from country to country. Messages accepted for transmission are not charged for. Amateur radio operators do this as a service for the community and for mutual benefit because they have an interest in the development of radio as a ready means of communication. The stations are privately owned and operated, in many cases entailing an expenditure of hundreds of dollars. To be able to communicate with others hundreds of miles away amply compensates the amateur for erecting a station. It affords one of the most fascinating and at the same time educational fields of research to most any person interested in science.

"Radio is indispensable in many of our present-day developments. Steamships and airplanes are lost if they have to do without the services of wireless. On railroad trains and automobiles, its application will eventually revolutionize modern business practices, just as the telegraph and the telephone have done. But to attempt to make far-reaching predictions, not even the most farsighted engineer can come anywhere within the actual facts which will be known ten years from now. [Remember that this was written in 1921.] Too little is understood of this greatest of all discoveries. That we will be able to talk directly with our friend riding in his car in another part of the country seems to be a dream still to be realized."

(End of 1921 written and recorded message.)

To be continued. 73

Why Not ß-Morse?

continued from page 18

All of these considerations induced me to conceive a new alphabet based on Morse code that I renamed ß-Morse for the following reasons. In the word alphabet, the Greek letter Alpha (α) stands for the first two syllables, and the Greek letter Beta (ß) makes for the last part of the same word . The two first syllables of the word having been rejected for lack of conciseness, the remainder forms, with the word Morse, the neologism *ß-Morse* (Beta-Morse).

This alphabet should be a source of motivation for Morse aficionados, as it is contributing to keeping Morse alive and well, at least in the mind of practitioners. It may be used in its handwritten version or eventually in computer software and its multiple applications such as packet radio, RTTY, AMTOR, and so forth. Let me know what you think! 73

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Building a Better Collins

continued from page 23

Can it be that good for only a buck?

This is a foolproof project that is rewarding because it saves big bucks and provides an added feature of interval timing that is far more accurate than the original, heat-actuated relay. If you're thinking this is not true, listen up. Surprising as it may seem, you can improve some things even in a Collins.

If, in our solid state replacement module, the 120 VAC power is removed from the circuit with a momentary shutdown, the full 180 cycle begins again. That is not the case with the tube design. Because of the residual heat remaining within the tube and components, the contacts do not release immediately.

Actually, they remain in the closed position even after power is removed. It takes a considerable amount of time for the metal to cool and the contactors to move apart. I have found that there will be continuity for up to a full minute after removing the heater voltage.

So what's the big deal, you say! The concern is that in certain unusual circumstances this shutdown delay can cause irreparable harm to the tube. If, for example, you required a rapid tube change, it's possible to apply high voltage to the newly installed final without the necessary delay time to get the cathodes up to speed. Even if the contacts opened during the time you were installing the final tube, or you shut down temporarily for another reason, the residual heat within the timer would shorten the delay by a considerable amount.

Unless this timer tube were absolutely cold, you couldn't be certain, with any degree of accuracy, about the length of delay. In that scenario, the wait time would be shortened to a point where the integrity of the tube was at risk. With today's tube replacement cost sky high, you don't need that grief.

It's a win-win retrofit project

The bottom line is that there is no down side to this project, so give my proposal a try. It's cheaper, better, less heat producing, and more ego rewarding than shelling out over a hundred-plus bucks to get the old gal up and running.

If you're a Collins purist and consider this project irreconcilable with your principles, try this approach on for size. Pull your working OEM tube and store it safely on the shelf. Keep in mind that it's an extremely valuable asset with a finite life. Why waste it? Use my timer relay module until you decide to sell the rig or you've scheduled a friend to visit the shack and listen to your much deserved bragging about the details and tribulations of the restoration process. A safe time before the demo, pop in the OEM tube. I assure you no one will know the difference, and I certainly won't tell. Good luck with the project and I'll see you around the Sunday afternoon Collins net (see the March 1999 *QST* for "The Collins Collector Association"). If you hear me in there, don't hesitate to let me know how you made out with the project. 73

Basic Transceiver Tester

continued from page 27

The primary output voltage ("volume") is controlled by R6 and P3. Both values were chosen because they are convenient ones easily found in most parts bins. I also wanted relatively large values to avoid excessive loading of my circuit. Additionally, realizing that the output of a microphone is relatively low, I chose resistance values that would give me a 10:1 voltage division, making the level setting on a cheap (and more readily available) single-turn potentiometer much easier; with a 12-volt supply, I get a range of 0–1.1 V, and approximately 11 mA through R6/P3.

Final assembly

Most radio manufacturers and/or manuals provide data on how much input is required to a microphone's audio for full signal output, and I set the volume level accordingly. Input and output capacitors to the audio amplifier aren't critical, but are recommended to avoid DC voltage conflicts. To avoid stray RF problems, I put the entire circuit in a grounded metal box, and bypassed all of my incoming and outgoing leads (for which I was careful to use shielded cable). 73

No Bum Steer

continued from page 36

affect the vertical angle of maximum radiation.

You will observe that in **Table 1**, as you proceed clockwise around the loop from A to B to C and D, and back to A, the same pattern directions as are obtained from A to C are obtained from C to A. This results at the 3.9 MHz design frequency because of current distribution on the loop. Please note that this effect does not occur when this same loop design is used in multiband operation. **Table 2** shows how the repetition occurs when this 3.9 MHz loop is operated on 40 meters.

At this point, consider just what occurs in such 40 meter operation. The following is referenced to 7.2 MHz. You will see from **Table 2** that the ellipse-type pattern obtained on 3.9 MHz is now a four-segment pattern with major lobes at 0 and 180 degrees, and minor ones at 90 and 270 degrees. Also, you gain four nulls at approximately 57, 125, 235, and 308 degrees. The "steering" feature, by selecting different feedpoints, becomes extremely useful, particularly with regard to avoiding a deep (typically more than 8 dB) null in your favored direction. It is interesting to note that with one 7.2 MHz feed, this loop produces only three major lobes when fed at B.

As noted with regard to **Table 1**, the lobes and nulls "repeat" as you proceed around the loop, and for such reason, only half of the feedpoints are shown in **Table 2**. By judicious selection, considering the actual orientation of your own loop, you can again select a feedpoint to "steer" the lobes and nulls for your optimum directions.

This same principle can be applied to 20 meters and higher frequency bands; however, there you are dealing with an increasing number of lobes and nulls as you increase frequency. It

would not be a trivial engineering matter to pick a feedpoint that would satisfy your lobe and null requirements for all bands simultaneously. Confined to 80 and 40 meters, the problem is greatly simplified.

Finally, there is the question of feed impedance. As previously noted, the height of the loop, and its wire size, ground characteristics, and surroundings, all affect the exact nature of the feedpoint resistance and reactance. Fortunately, the use of quality open wire transmission line (not 300 ohm twinlead) and a good antenna tuning unit (ATU) can overcome the matching problem (see Note 5). Good open wire lines can accommodate very high SWR with very little loss, even on long runs from the shack to the antenna. Moving your operating frequency within a band or from band to band will, of course, require a readjustment of the ATU. In extreme cases, a change in length of the transmission line may be required to allow your ATU to accommodate all bands. While these problems do exist, it is believed that the optimization of signals afforded by this form of "steering" is well worth the effort.

Notes

1. DeMaw W1FB, "A Closer Look at Horizontal Loop Antennas," *QST*, May 1990.
2. Fischer WØHMS, "Loop Skywire," *QST*, Nov. 1985.
3. *EZNEC* by Roy Lewallen W7EL.
4. *AO6.5 & NEC Wires 2.0* by Brian Beezley K6STI.
5. M. Walter Maxwell W2DU, *Reflections*, ARRL Pub., 1990. 73

QRX

continued from page 8

The Commission also amended the rules to eliminate what it called "now-unnecessary record keeping and station identification requirements" that apply only to stations using spread spectrum. The FCC agreed to let SS stations identify themselves using conventions developed by the amateur radio community.

Roanoke Division Vice Director Dennis Bodson W4PWF, who has followed the League's Spread Spectrum initiative through from start to finish, was pleased with the outcome of the proceeding. "I'm very happy," he said. "The League got everything it wanted and more — all of which, I believe, will help to promote this mode on the amateur bands." Bodson served as the ARRL Board liaison with the future systems committee and chaired the Ad Hoc Committee on Spread Spectrum, which was instrumental in developing the League's stance on Spread Spectrum.

Stations employing spread spectrum techniques will remain secondary to — and must accept all interference from — stations employing other authorized modes. The FCC declined to authorize the use of spread spectrum techniques on additional bands or frequencies.

A copy of the FCC's complete *Report and Order* is available at [http://www.arrl.org/announce/regulatory/wt97-].

Thanks to *Harmonics*, newsletter of the South Jersey Radio Association, Sept. 1999.

VCR Y2K

If your VCR has a year setting on it, which most do, you will probably not be able to use the programmed recording feature after Dec. 31, 1999. Don't throw it away. Instead, set it for the year 1972, as the days are the same as the year 2000. Manufacturers won't tell you this — since they are in business to sell Y2K VCRs.

Thanks to *Harmonics*, newsletter of the South Jersey Radio Association, Sept. 1999.

Polarized Sunglasses and LCD Displays

Finally, at the end of the summer, after peering through dozens of scratches in my eight-year-old sunglasses, I decided to purchase a new pair. The optometrist suggested polarized lenses, so I bought them. What a difference — much less squinting in direct sunlight and the glare from reflected light is dramatically reduced.

However, I soon realized that I wasn't exactly looking at the world as I had been accustomed. Many rear and side windows of cars now take on a strange checkered pattern. Some windshields on oncoming cars are now a deep, almost iridescent, blue-violet color. And at times, depending on lighting conditions, portions of the road surface appear to be raised into an exaggerated 3-dimensional form. The windshield on my Goldwing is no longer clear — it has now taken on a multicolored rainbow tint, limiting my closeup view of the road. This instant change has been somewhat of a psychedelic experience for me, but the glare reduction and comfort of the new polarized sunglasses has been worth it.

However, the biggest problem associated with wearing these new sunglasses is when I try to read the displays on some of my mobile transceivers (Standard C5718DA, FT-900, Radio Shack SWR/Power meter, and Alinco DJ-599). The backlit liquid crystal displays on this equipment become difficult to impossible to read, depending on lighting conditions. Tilting my head to one side improves the situation a little, but when driving (especially in public view), I usually refrain from tilting my head to one side until my ear touches my shoulder.

Here' a bit of information about polarization of light.

Polarization is one of the fundamental properties of light waves. It was discovered in 1808 by E.L. Malus, a French army engineer. He was fascinated by the optical properties of the crystal calcite and frequently carried a piece with him to demonstrate its properties to his friends. One afternoon, while looking through his crystal at the windows of the palace of Luxembourg, he noticed that the image changed as he rotated the crystal. He could not explain his observation but actually had discovered that light was polarized by reflection.

The principle of a polarized lens is best illustrated by observing the use of venetian blinds. The blinds block light at certain angles, while allowing light to transmit through selected angles. True polarization is achieved by shutting out 100% of undesirable light and allowing 100% of desired light through.

Light striking flat surfaces, such as water, snow, glass, or pavement, is reflected perpendicular to that surface. This reflected glare or polarized light is much more intense than normal sunlight, irritating your eyes and inhibiting vision. Polarizing lenses have the unique ability to selectively eliminate glare. Through the horizontal alignment of polarizing micro crystals, these lenses block all vertical light, making polarized lenses particularly suitable for water sports, cycling, and driving.

Polarized lenses have been used in over one billion pair of sunglasses over the last 50 years and their use remains widespread today because they have a clear functional benefit for the wearer. Polarized lenses are the best way to eliminate both bothersome glare and dangerous UV light.

Any pilots among us must beware of using polarized lenses in aircraft. Most aircraft windows are made of multiple layers of plastic. When viewed through polarized lenses, distortions and stress areas are visible — which can be distracting and dangerous.

The LCD displays on our radios emit light that is polarized. Apparently several of my radio displays emit vertically polarized light, and my new sunglasses do an effective job of blocking this vertically polarized light, making the displays nearly invisible. I suggest that before you decide whether or not you want to have to deal with the effects of polarized lenses while driving and operating your ham radios, you should ask your optometrist if you can take a pair into your vehicle and give them a try.

Thanks to author Mike Stone N1VE; reprinted from the October 1998 issue of *The Communicator*, the monthly newsletter of the Central New Hampshire Amateur Radio Club. 73

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Microwave 10 GHz Contest preparations — Considerations for portable operation

This last weekend in October was the ARRL 10 GHz and up microwave contest. I had to scale back on my participation due to a recent knee injury that prevented my full involvement. However I was still able to operate on 10 GHz from my home location and made several contacts, keeping my feet wet and in the game. Only made a few contacts with an omni antenna at 10 GHz at the home QTH, but had lots of fun listening to liaison contacts being set up here in Southern California.

I have to credit those who packed up all their microwave gear and took it on a traveling expedition to great hilltop sites in this last ARRL 10 GHz contest. If you have never operated portable microwave, you are missing an opportunity for a lot of fun in the sun, at least here in Southern California. But, sure, there are lots of things to set up prior to a hilltop expedition to make the trip a successful venture.

Microwave being what it is, operation from a high spot in the clear means packing quite a bit of equipment up to this semiremote high point for good microwave contacts. Not only does your converter have to function well, but there are so many other aspects that need attention to ensure a good trip.

First and foremost, for portable operation you need a good source of power. Normally, remote power is derived from 12 volt batteries. In some cases, several are connected in series for 24 volt operation when commercial TWT amplifiers are used for high output RF power in the 10 watt and above range. These TWT (Traveling Wave Tube) amplifiers' normal DC power requirements are set up for either 24 volts or 48 volts DC. Needless to say, at 48 volts that's a lot of 12 volt batteries to haul around to a remote site — making 24 volt operation a little more desirable.

The batteries for reliable operation normally sit around for a year unless you have other uses for them on noncontest weekends. This means that a complete checkout of battery capacity should be done to ensure that your batteries will not fall flat after a few hours of use. Normally, batteries with a capacity of 25 to 30 or more amp-hours are required, allowing you at least 10 to 12 hours of operation before recharge is required. On such a battery stack for 24 volts, you have power taps at 12 volts for 2 meter liaison power that on transmit draws several amps for high power rigs to 2 watt HTs that draw little on the battery current budget. Add to this the 24 volt TWT current of 2 amps in standby and 5 amps in transmit, plus the power required to run the microwave converter, and they all add up fast. Usually, with a TWT amplifier there is little thought of backpacking in a rig, as the weight of batteries required make the trip an expedition rather than a trip to a hilltop site via automobile.

The current budget can be reduced quite a bit by using a solid state amplifier, reducing current consumption and still allowing for 1 watt of RF power from solid state amplifiers. Backpacking to a high spot can be accomplished, as a battery of less weight and amp-hour capacity can be employed.

In either case, don't just charge your battery to get ready for remote operations. Rather, charge the battery and then hook it up to a dummy load resistor or even a string of automobile headlamps, to check the capacity of the battery you intend to use. Make readings of terminal voltage under a constant load, plotting just how much current is available from the battery under test. As you know, headlamps make a good test, as they will deplete your car's battery if left on. Don't go out and purchase headlamps; instead, check with your local service station for old ones that have one lamp burnt out — they will work fine for our application.

I had an old, low-capacity YUASA 17 amp-hour battery that showed 6 amps or so of usable capacity. It would charge but was a soft battery for use. I left it for HTs and other low current uses. However, the story changed when I purchased a used garage sale Power Wheels battery-operated low-speed kid's toy truck that our grandchildren could sit in and ride. It was missing the batteries (2 each 6 volts). Considering the form (size of battery required) factor, only the soft YUASA would fill the bill for use in this truck. Sure enough, the kids drained the battery in short order, and I recharged it again and again after each use. They had lots of fun, and I learned a time-proven lesson again.

After each recharging I noticed a very distinct change in battery life, and after the third charge/discharge cycle over two days' worth of use, the battery returned to its nearly 17 amp-hour capacity rating and did not show any signs of being "soft" anymore. This is not a NiCd but rather a gelled sealed battery. Don't know if this is normal for gelled cell batteries, but it changed my evaluation of batteries and the charging methods to use. Considering that we normally are working with used batteries, it's worth a shot to see if any improvement in capacity can be attained.

Another good battery-related tip is to avoid clip leads for connection to your battery backs. While the clip leads work well, there is an inherent danger in connecting them up with reversed polarity and inflicting damage to your converter or the HT used for liaison. Use a standard connector decided upon and make that connector your battery connector. Use it on all DC requirements for 12 volts. Select a separate connector for other requirements such as 24 volts.

I use a three-contact connector for 12 volts (one pin no connection) and a four-contact connector for 24 volts (2 pins no connection) to prevent them from being cross-connected. It has saved a serious problem from happening due to reverse polarity and wrong potential power problems in the field. Check out your wiring in the shack at your leisure, and in the field it will not be in error even under panic conditions, as only the correct connector will mate to proper power.

Converter operation is also an item to check. How well is your receiver operating, and do you get rated power out of your transmitter? Simple checks in the home shack can be made ahead of time to prevent trouble in the field. Verify it and don't depend on how the rig operated last year. I have found even the venerable SMA connector or good-quality adapters in the RF path to show up after years of use as quite lossy. Some of the problems showed up in coaxial relays that failed a simple ohmmeter continuity check. Shake and bake is not just for chicken! For improved microwave enjoyment, use the technique for your rig's checkout before going to a remote hilltop.

Also, use a good-quality heavy tripod for your dish antenna

system and mount a compass rose even if you have to make one on a copy machine and mount it on stiff cardboard to allow your pointing in a calculated direction. This simple tool will greatly enhance your operating skill level and help you aim your antenna more accurately for distant stations.

Seek the high ground, as while microwave does reflect off objects, it provides the best performance when operation is in the clear, high above foreign objects, buildings, and green foliage. Trees and other similar "green" foliage plants make great attenuators and as such are counterproductive to microwave energy. While shots can be made through trees and high bushes, they are still a good microwave absorber and attenuate our signals, making contacts quite difficult. Whenever possible, set up in the clear and avoid trees.

I should take my own advice and not shoot through trees, but this was not the case for my participation this contest weekend. Being unable to load a dish and carry the batteries needed for portable operation, I attached an omnidirectional waveguide antenna in midtree, perched on a long stick and lashed to our kids' tree fort in our back yard, and was successful in working several stations on 10 GHz. Part of the success was because I was running 10 watts of power. Even with this power level I was able to only work local stations. The trees where the antenna was perched proved again to be very lossy and prevented me from working more distant stations.

First and foremost, make checks to verify your microwave transceiver prior to venturing outdoors. Several weeks before anticipated operation, get together with a buddy and check out your rig. Your shack is very forgiving to needed repairs and offers all ranges of tools and test equipment to do needed adjustments or repairs. Don't get caught using a rig that has been sitting on the shelf since last year's contest. Check it out and verify its operation and performance under actual contact conditions.

The San Diego Microwave Group meets a month before contest time at Kerry N6IZW's home, where we all re-evaluate our microwave rigs to ensure that they rigs are operating at peak performance. We verify not just the rig functions, but that power output and dish, feed, and transmitter power are all in good alignment. We use a system that provides readings of detected power at a remote site some 100 feet distant. This antenna/rig test range is quite simple, and is nothing more than a small antenna coupled to an RF switch for both receive and transmit tests. In receive, we compare the station's ability to detect a low power signal source used to simulate a 144 MHz drive source, and vary the generator's power on transmit to the remote simple converter and determine minimum detectable signal strength on each 10 GHz rig.

This scale is charted out to accommodate different antennas' gains and such to make all different setups/antennas used, etc., fit on this equalized playing field. We calculate the differences between calculated gains of the antennas used to expected power output so that the final number crunched out relates to a total system quality factor. In practice, for receiver testing each system is set to detect a remote transceiver for which we control the drive signal to arrive at a minimum discernible signal level. We then figure in the antenna gain and other factors to see if this system is performing as well as it should.

Considering the antenna gain and preamp noise figure, we can compare all rigs to each other by this minimum received discernible signal level. This is related to the 2 meter drive required to produce a low output signal at the test transmitter used for these tests. Receiver problems show up quite easily if there is a sensitivity problem. In actual tests, we were able to set all tested receivers to within 1 to 2 dB of comparison performance specs, allowing for antenna differences (after several rigs included some toughening up to improve performance).

On transmit, the remote is now a receiver, and we measure detected 144 MHz (the IF signal) power on a power meter and derive actual recovered total system transmit performance. If the power recovered at the remote receiver is low, the transmitting system needs some attention. The fault could lie in several areas. There could be a dish that is not being fed properly, or trouble in coax relays or connectors, or even low performance amplifiers for output power. Each element needs some attention to determine where the performance improvement can be made to bring the transmit system to proper operation. Again, allowances are made for power output and dish size in comparing all stations tested. Test your station and determine if it is operating at peak performance before you venture out to a remote site. Trouble-testing your systems before going to a remote hilltop location is a very prudent step to ensure good system operation.

Last and probably most important is to take care of your comfort on a remote hilltop. Bring a chair and clothing to match unexpected conditions. Always overstock on liquids, sunscreen, and even a hat for your enjoyment. Bring several pencils or pens as you prefer. If you have room, use a clipboard to hold your logging notes and other contest-related notes, plans, maps, and schedules.

Most of all, be prepared for a great experience — hilltopping on microwave. Set up early, check out your equipment, and have a great time making contacts. 73, Chuck WB6IGP. 73

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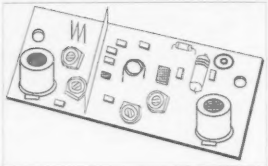

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For further info, contact ICOM America, Inc., 2380 116th Ave. NE, Bellevue WA 98004; tel. (425) 454-8155; site [www.icomamerica.com].

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16	Astron Corporation	1	•	E-Z Hang	51	136	Morse Express	25	•	Radio Book Shop	49
41	Barry Electronics Corp	11	193	GGTE	49	193	Morse Tutor Gold	49	•	Radio Book Shop	50
42	Bilal Company	21	•	Hamtronics, Inc.	CV2	248	Motron Electronics	43	•	Radio Book Shop	56
56	Buckmaster Publishing	27	•	Heights Tower Systems	39	•	MultiFAX	23	•	Radio Book Shop	63
168	Buckmaster Publishing	30				•	Nexus	57	•	Radio Book Shop	64
99	Communication Concepts, Inc.	31	42	Isotron	21	•	Omega Sales	27	34	Ramsey Electronics	5
			242	Jan Crystals	21	•	Omega Sales	54	•	RF Parts	43
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			•	Kachina Communications, Inc.	CV4	•	Peet Bros.	29	36	Scrambling News	30
276	Computer Aided Technology	53				•	R&L Electronics	9	167	Sescom, Inc.	23
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•	Denver Amateur Radio Supply	17	•	Michigan Radio	33	•	Radio Book Shop	43	141	The Nicad Lady	47
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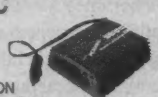

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Floyd interrupts the routine

By its very nature, emergencies are successfully managed only by having redundant capabilities. Likewise, we always have the need to use resources in an emergency that we may not use during ordinary times. A fire extinguisher sits on the wall receiving little or no attention during ordinary times, but is quickly retrieved and used when smoke or flame is noted. This same situation exists among ham radio operators during emergencies. Our very services as communicators are not relied upon during routine situations, but become critical when Mother Nature or other forces interject their effects into everyday life.

I was thinking about this the other day when Hurricane Floyd was in the news. Here in central Florida we were at risk of winds of up to 150 miles per hour if Floyd had followed the track that it was projected to take. Winds at that speed can evidently flatten a cinderblock and stucco home as easily as a woodframe structure. Fortunately for us, the storm turned and did manage to lose some of its power before clobbering the Carolinas. In preparation for the storm, amateur radio operators were covering the public service agencies, hospitals, shelters, and the National Weather Service.

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Now, the station at the weather bureau is great. There are two VHF rigs — one on a vertical, and the other on a beam. There are several computers at the operating position, one of which can operate APRS, another of which shows the display of the NWS radar system. The station even has the perfect call—WX4MLB (MLB being the airport designator for the Melbourne, Florida airport where the weather station is located). This station has been well thought out and well supported by both the Weather Service and the ham community, and could serve as a model for other facilities. Yet when facing an event like Hurricane Floyd, I found that redundancy was the name of the game.

Naturally, when I first arrived at the weather bureau I set one of the 2 meter radios onto the network frequency for disaster services. We had decided that until events dictated, we would utilize a single frequency rather than have SkyWarn on one and disaster services coordination on another. I set the other radio to APRS, which utilizes a packet terminal node controller (TNC) and displays a map indicating station locations; since some of the APRS stations have weather reporting systems, I thought this might be useful. For something as large as a threatening hurricane, the weather reporting was not as useful as in other situations, which was just as well. The weather problems began to build in a manner where they threatened the counties to the south, so I switched that rig to their SkyWarn frequency and monitored the hams to the south.

Naturally with a large storm and adequate warning, evacuation may be advisable. The county mandated evacuation for the barrier islands and, given the potential for damage, many people elected to head for higher ground further inland. As the major roads and interstate highways began to clog, we found the need to stay in contact with disaster services stations to the north and west. I was requested by net control to establish contact with the Orlando area net. This meant swinging the beam from the south to the northwest and getting on Orlando's frequency, and using the vertical to keep in touch with the stations to the south. My personal handie-talkie then became the link to the local network. Naturally, I had brought my "Grab and Go" bag with me, and I had the HT set up with a 5/8-wave telescoping antenna in the desk charger with the speaker mike.

Now, as you might expect, with three radios operating simultaneously, things can get a bit confusing. The nets in Orlando and the Treasure Coast net in the counties to our south were handling traffic that was not always of interest to the weather service or disaster services.

I decided to connect an earplug to the HT tuned to the local net so that I could focus a little more closely on the local situation. This was also helpful because there was a fair amount of extraneous noise as the weather forecasters tried to perform their duties — especially when they held periodic conference calls with other weather stations in order to determine the best information for tracking the hurricane.

So in a very well-equipped facility, I had already begun to employ a fair amount of my own gear on top of the gear that was already on site. As I said, redundancy is the name of the game in an emergency! Perhaps this became even more obvious to me, because a few weeks before Floyd reared his ugly head, I had lost the display on my Kenwood TH-79A. Now, I really love this radio and think that it has many fine features, but the display has gone out on me twice, and both times were at the height of hurricane season. Fortunately, the unit had gotten back from repair a few days earlier and was available. But what if it hadn't?

Well, no true ham needs much of an excuse to obtain one more toy. In my case another in a seemingly endless succession of birthdays occurred and the YF (I still prefer that to XYL) bought me one of those new miniature-size HTs. Many manufacturers are offering these small units — mine happened to come from Radio Shack and is their HTX-200. While I prefer to have a higher power output available, I have been greatly surprised by this little unit. The 200 mW available when operating using the two AA cells is adequate to bring up the local repeaters with full quieting. It is possible to plug in an external power supply, too; a 9 volt power supply will boost the output to 2 watts.

The unit has 30 memories that store frequency, offset, and CTSS tone (as well as a receive tone if desired.) It is truly shirtpocket in size (2-1/4" x 3-3/8" x 1-1/16") and weighs only 4.2 ounces (plus batteries). In order to keep the size small, it lacks a few things such as a DTMF keypad, and the display may be a little small for some. My solution was to program everything in good light while wearing my reading glasses so I wouldn't have to mess with it under field conditions.

During Floyd I used this as my portable unit while the Kenwood acted as the third desktop unit. This allowed me to be reachable (or at least monitor traffic) while stepping away from the operating position for a bite to eat, a cup of coffee, a breath of fresh air, or a restroom break. For everyday use, this fits comfortably in my briefcase, so I always have an HT with me. Some radios are just plain fun as well as useful, but then this is a hobby, after all. 73

QRP

Number 51 on your Feedback card

Low Power Operation

Michael Bryce WB8VGE
SunLight Energy Systems
955 Manchester Ave. SW
North Lawrence OH 44666
[prosolar@sssnet.com]

Even though the HW-8 I had just purchased looked very good, it was in fact as dead as you can get. There is no audio, no sidetone, and no static coming from the headphones. However, if you keyed the transmitter, it did produce a good 2.5 watts of RF. Knowing that the transmitter did in fact fire up meant a lot of things.

Start out by looking at the stuff that works first

Since the HW-8 is a direct conversion design, having the transmitter meant that the local oscillator, the VFO, and heterodyne oscillators were all working! With the aid of my frequency counter I could tell that the bandswitching scheme was in fact working, as each band was on frequency and stable. All the bands produced an output except for 20 meters. That band was really dead: no transmit! Since the HW-8 uses switching diodes to select tuned circuits and for selecting the proper crystal used in the transmitter, a good bet would be a bad diode someplace. But, for now, the problem at hand was getting something to come out of the headphones.

Remember a few months ago, when I mentioned I had assembled a Ten-Tec universal audio amplifier kit? Well, that little guy came in hand very nicely while troubleshooting the HW-8. Since all the RF sections were operating, the trouble should be someplace in the audio chain. There's a chance that the reason for a dead receiver may be the RF stages of the receiver, but since there is no audio, I'll let the RF section sit for a while.

Since a direct conversion receiver gets 99 percent of its gain at audio frequencies, it's easy to pick up some of this audio as it moves from the mixer to the headphones. In the case of the HW-8, there are several stages of audio gain along with a section or two of audio filtering. The sidetone is also injected in this audio chain. Since we have no sidetone, the problem must be after the tone is injected into the audio amplifier. I used my scope to take a peek at the output of the sidetone generator. Sure enough, the HW-8 was in fact producing a very nice and strong sidetone when the key line was closed.

Most of the audio generated by the receiver section in the HW-8 is very low level. There is a small PC board supported by a single mounting screw and standoff on the right side of the chassis. This guy is the audio power amplifier! Using the Ten-Tec audio amplifier, I had audio going in, but nothing going out. Hmmm. Sounds like there is something kaput on this PC board. After taking some voltage readings, to make sure that VCC and ground were in fact available to the board, the likely suspect was a single transistor.

Heathkit has always been known to use semiconductors having odd pinouts and strange part numbers. So, without missing a beat, I stuck in a transistor I had in the ol' junk pile. Fired the HW-8 up and whoa! There be static in the headphones! Oh, yes: Remember, if you ever pick up an HW-8, or HW-7, the audio output is designed for high impedance headphones! Those walkthing headphones won't work with the HW-8.

Hearing signals once more on 40 meters from the HW-8 can produce a case of the warm fuzzies. However, those soon cooled off as I tried to get 20 meters to come alive.

A dead 20 meter band

The 20-meter band did not produce any RF into the dummy load. Once the audio problem was fixed, I expected to hear signals on that band, too. Alas, nothing but some static.

Because the HW-8 uses the VFO to produce many of the signals required, it's easy to check out the receiver and transmitter circuits with only a general coverage receiver. All you need to do is tune your general coverage receiver to the frequency display on the HW-8's VFO. You'll be able to hear a steady tone produced by the HW-8. You can increase the signal strength of the VFO circuits by draping a wire connected to the general coverage receiver close to the VFO can inside the HW-8. Just be sure you don't allow the wire to touch the VFO variable capacitor. Doing so will cause the HW-8's VFO to shut down.

With your general coverage receiver tuned to the VFO's frequency, you should be able to hear it quite loudly. You may have to tune the VFO up or down in frequency to hear the beat tone. The HW-8 is not known as a frequency standard, and the VFO will more than likely be off frequency. It only takes a few minutes to tell if the correct signals are being generated by the HW-8. In my case, everything was there except for the 20-meter band. Nothing was heard in the receiver, so a more drastic approach will be needed to track down the problem.

As I mentioned earlier, Heath uses switching diodes to select the proper tuned circuits and crystals used by the HW-8. The

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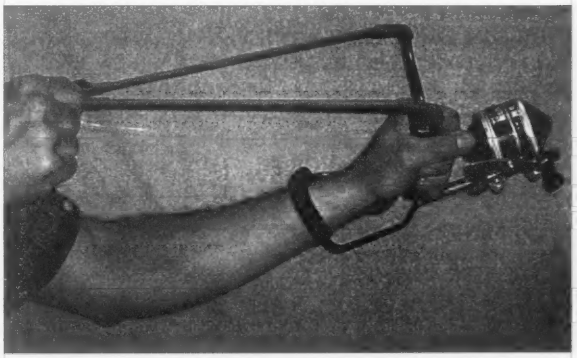

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You may wonder, as I did, about the real acceptance of PSK31. Just a little over a week ago (during September), a 24-hour contest was staged for the new mode. Several interesting things became apparent.

The first point of interest was obvious to me when I only accidentally ran across the listing of the contest in *QST* during the week previous to the contest. Surely there were other notices because the activity was there in full force, but I only saw the one.

I admit I am not a contester — and, I want to be perfectly clear, this is only because it is a skill I have never developed. However, I do admire those who participate and do well. For me, it is a bit intense — I don't do well with handheld games either.

But I did listen and make a few contacts (seven of them). By Saturday morning, I heard stations that were reporting in excess of 300 contacts. I was impressed. There were stations from Europe, Asia, and South America, and I worked a few of them with my little peanut whistle signal.

I noticed some big gun signals. It seems that the norm for those running power is about 200 to 300 watts. Some may be a bit "louder." However, the saving factor with PSK31 is that it is an excellent weak signal mode. All that is necessary is for the receiving station to tune carefully. Many signals that do not wiggle the S-meter are 90 percent readable or better.

I managed a solid contact with JG1GGU, and my signal was heard by OA4CVT, but the info exchange wasn't good on the latter and he moved on. I was just glad to be heard. The most interesting station I heard was BV2B. He never heard me, but it was a thrill to hear the signal from China and know that interest in the mode is alive and well there also.

Another new toy

I received an E-mail from Bill N5ALO, who pointed me toward the PSKGNR software that works with the original PSK31 software for Windows™. The package is conveniently set up to be downloaded to two floppies for easy transport. The Web site is [http://www.al-williams.com/wd5gnr/pskgnr.htm].

I downloaded it and printed the manual, and it is a delight in several ways. Installation is easy. It takes care of itself in that you put it in a separate directory, click "setup," and it jumps through all the necessary hoops. When it is finished, you just keep following directions to run the program and install your callsign.

The part that sounds scary to me is that this is a front-end for the PSK31, so both Windows programs are meant to run concurrently. When you boot the PSKGNR, it hunts for the PSK31 program and, if it is not already running, starts it as well. Once you get both screens showing on your monitor, you make your own effort to "tidy up" the displays because one is bound to overlap the other.

A little click and drag, and you are all set. The next time I started the program, both were in their new positions on the

---

Heath company must have bought 1N914 diodes by the traincarload. They're used in most Heathkits I've seen.

They're easy to check. In the HW-8, when you press one of the front panel push-buttons to select a band, 12 volts is routed to the proper switching diode. All you have to do is locate the diode, and check to see if plus-12 volts is applied to one end when the proper button is pushed in. If the diode is good, you'll see it pass the voltage. If you see the switching voltage going in, but nothing coming out, the diode is open. Likewise, if there is voltage on both ends, the diode is shorted. Also, the band selector switches have a zillion wires coming and going. A broken one may prevent the required switching voltage from reaching the proper diode.

I've discussed how the switching diodes work in each circuit in past columns. There's no need to dig into their operation again. You only need to do some simple voltage checks to find a kaput switching diode. Also, remember there are several diodes scattered around the HW-8 that must switch various parts in and out of the tuned circuits. Check all the diodes used by a given band.

Well, after checking all the diodes and for broken wires on the bandswitch, it looks like for all the world like I have a bad crystal in the mixer oscillator. The oscillator works on all the other bands, so all of its pieces parts are functional. It's only on the 20-meter band that things are dead. A scope and frequency counter show nary a peep out of the oscillator when 20 meters is selected. The only variable left is the crystal.

Crystals usually just don't up and quit. I resoldered the connections on the PC board, but, alas, 20 meters is still kaput. Guess I am going to have to order a crystal from Jan Crystals and see about getting this guy all fixed up.

HW-8s are getting old

I can remember putting my HW-8 together way back in 1978. Like the HW-8, I am a lot older and things are starting to break down. Since it's pushing over twenty years old, some care must be used when working on the rig. The PC board is the old paper-based stuff. Excess heat can easily damage the board and the copper pads. Use only enough heat to melt the solder. Solder wick works quite nicely on the board. A good vacuum desoldering tool is a nice item to have, too.

There are not too many half-watt resistors left in my junk box. You can use the now-standard quarter watt guys in most of the circuits used in the HW-8. Radio Shack stills carried some half-watt resistors the last time I looked.

The capacitors are reaching the end of their lifespan. Keep a sharp eye out for leaky electrolytic capacitors. The capacitors used in the tuned circuit may have changed values enough to cause these circuits to operate incorrectly.

Be awfully careful with the mechanical pieces parts. There's no source for such parts as the VFO variable capacitor, the meter, and the bandswitch. If these are kaput, then you'll have to go dig up another HW-8 to steal parts off of.

They're getting old, and harder and harder to find in good shape on the used market. The other night I was trolling the Internet. On eBay, an unassembled Heathkit HW-9 was going for over $600! I shudder to think about what an unassembled HW-8 would go for.

The Heathkit HW-8 is a classic QRP transceiver. You're just not a QRP operator unless you've put an HW-8 on the air. If you find one at a hamfest or via the Internet, pick it up. Even if it does not work, it's still a classic! 73

monitor just as I had left them. Somewhere in the Options box, I think I saw a choice to click on to cause that to happen. It was either clicked by default or I clicked it (or maybe it just works). Small item.

One really nice feature of the PSKGNR is that it allows type ahead. Very handy for those of us who don't like to look like we are stumbling through the first line or so when it is our turn to transmit. And, if you have a head start on the typing you can stay ahead for a minute or so ... right up to the time you remember where the brag file is you want to send.

Plus, it already has some macros set up, so you can enter the call of the station worked and his name and the macros will pick these up when you press the appropriate function key. For instance, the F1 key is programmed for W1XYZ de KB7NO as soon as I press R12 and enter the W1XYZ in the pop-up box.

There is more. There is a serial number feature with automatic advance. This thing is going to trap me into doing the unthinkable and get serious about contesting. It just plain makes it easy.

As you can imagine, you will need to keep track of commands for both screens. That has been simplified. What you want to remember is to keep the PSKGNR screen active and avoid the temptation to click on the upper PSK31 screen, which will activate it. That action is not a disaster. If you wish, you may use the PSK31 program as though the other program isn't running. It will work.

What the author did is about as intuitive as it gets, but I am still sneaking peeks at a cheatsheet by the keyboard. The function keys you used to use for PSK31 still exist, if you remember those functions have a "Control" key added to them. That is, if you want to toggle the squelch in the PSK31, you use Control F2 and don't succumb to clicking the button. If you click, you have to exercise the gray matter and get back to the lower screen. It took me awhile, but I think I had an on-the-air 20 minute chat a little while ago with next to no confusion.

The plain vanilla function keys (just press them by themselves) control the new functions on the lower screen. I guess some folks would apply the logic that if we want to control the upper screen, we must use the Control key. Sounds good, works for most. You will need to keep the cheat sheet handy until you have used the new functions for a spell.

There are such functions as the ID exchange ([worked stn call] de [your call]), your call by itself, the time and date stamp, and the other operator's name. Plus, there are more than a half dozen handy mini-macros like that to keep you up on whom you are talking to and reduce the "repetitive action" syndrome. I didn't see any guarantees, but it should diminish the possibility of the active ham contracting carpal tunnel syndrome.

I nearly didn't mention another set of programmable keys. You can use the Shift key with the function keys and build your own set of handy timesavers. Also, you can set up to retrieve any larger file and send it. You will figure what works best for you. It would seem you could run the first two or three exchanges with a contact before you would need to resort to actual typing. I don't think I could stand to be that lazy, but the program offers the capability.

The screen shot is my layout for the two programs on the same monitor. You may wish to make the upper PSK31 screen a little larger in proportion, since both the transmitted and received text is on the same screen while only outgoing text is on the lower screen.

I had a little problem getting that screen shot to cooperate, so there was a bit of touch-up performed. I had to do it in black and white and it lost quite a bit of definition. I just wanted you

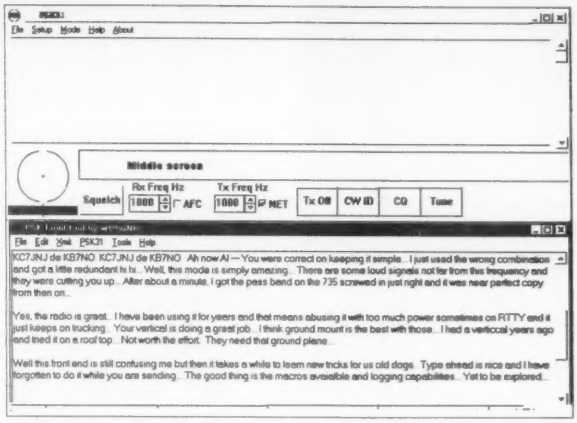
File Setup Mode Help About
Middle screen
Rx Freq Hz
Tx Freq Hz
Squelch
1000
AFC
MET
Tx Off
CW ID
CQ
Tune
File Edit View PSK31 Tools Help
KC7JNJ de KB7NO KC7JNJ de KB7NO Ah now AI — You were correct on keeping it simple... I just used the wrong combination and got a little redundant hi hi...Well, this mode is simply amazing... There are some loud signals not far from this frequency and they were cutting you up... After about a minute, I got the pass band on the 735 screwed in just right and it was near perfect copy from then on...
Yes, the radio is great... I have been using it for years and that means abusing it with too much power sometimes on RTTY and it just keeps on trucking... Your vertical is doing a great job... I think ground mount is the best with those... I had a vertical years ago and tried it on a roof top... Not worth the effort. They need that ground plane...
Well this front end is still confusing me but then it takes a while to learn new tricks for us old dogs. Type ahead is nice and I have forgotten to do it while you are sending... The good thing is the macros available and logging capabilities... Yet to be explored...

Photo A. *Screen shot. This is a view of both programs (PSK31 and PSKGNR) up and running, each occupying about half the screen. The bottom screen is used for composing your message. What you type goes here as well as any automatically inserted text. When you tell it to send, the text goes to the box just above it, labeled middle screen. In the end, the upper screen not only gets the received text but also the transmitted text. The middle screen is the composing screen in the PSK31 program if you are using it by itself. You can type ahead in the large bottom screen and the text remains there until you tell it to send. The control keys are intuitive, as they mimic the original PSK31 keys, but you have a new set of rules to learn so you can control the functions of both screens with only the lower screen activated. Very slick once you get the hang of it. In the white area at the bottom there are more useful buttons. These didn't display in the screen shot.*

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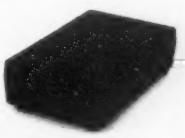

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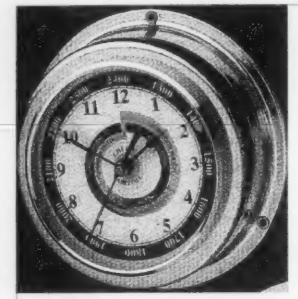

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to get an idea of what it looked like. The monitor does take on the full flavor and colors of any Windows program.

I have both of those programs running in the IBM laptop and they seem quite stable. That remark is because some pieces of soundcard-based communications software act very strangely in the laptop. It is a good idea, depending on the sound system of your laptop, to approach with a modest layer of apprehension. I know they do not all work as well as this one. I have not run across an authority on what is compatible and what is not. You just get to wing it.

And, I realized today, the laptop has only 256 colors. That was part of the problem with the screen shot. My wife will never understand why I need so many new toys.

PSK31 can lead to new horizons

A while back, I received a call on PSK from an enthusiastic ham who had been on the air for 25 years, was reading my mail, and gave a shout because I was the first Nevada station he ever worked. So PSK was good for him, but wait ... Joe KX4JR brought me some new wisdom that simply blew my mind.

There are two parts. The first was he pointed me to a Web site [http://members.xoom.com/ZL1BPU/Contents.html]. I plugged the address into my Netscape v.4.0 and it acted unusual. Instead of displaying a Web page, a download was initiated. I fiddled with that for a while to be sure I wasn't doing something wrong and also that the download was what was intended.

Then I put the project aside, or at least to the back of my mind, and several weeks later tried the URL again with the same setup — and got the same result. This time I had an alternate plan. I had the laptop set up on the desk and plugged it into the phone line and used the older v.3.0 Netscape. The Web site acted perfectly normal. That was worth tucking away in memory.

However, and this is BIG, that wasn't the only learning experience Joe was responsible for. The Web site, and you must go there to prove I am not pulling your leg, has description with pictures, history, and instructions of how to get started in a totally different digital communication process called Hellschreiber.

The system was invented back in the '20s, was used over phone lines, and works somewhat like a facsimile. I don't recall if the historic description included use over radio in olden times. The review is a bit long, interesting enough, so I didn't take the time to read it word for word.

It probably was never really practical for hams to experiment with until this day of the computer. That is, it was likely very heavy on the hardware side as in the earlier days of RTTY. The site directs you to downloads (free) of software that will get you into business. They even have listings of net schedules with times and frequencies. The whole idea looks like it would be a lot of fun to see it work, considering the history of the project.

So, after absorbing as much of this as I could at one sitting, I sent off to Joe the QSL I had been holding hostage and told him what a great service he did for amateur radio by letting me in on this. Now that I am passing it on to you, you too will

Current Web Addresses

Source for:	Web address (URL)
HF serial modem plans + software	http://www.accessone.com/~tmayhan/
SV2AGW free Win95 programs	http://www.forthnet.gr/sv2agw/
BayCom — German site	http://www.baycom.de/
Pasokon SSTV programs & hardware	http://www.ultranet.com/~sstv/lite.html
PSK31 — Free — orig. PSK31 — also Logger	http://aintel.bi.ehu.es/psk31.html
PSKGNR — New — Front end for PSK31	www.al-williams.com/wd5gnr/pskgnr.htm
Baycom 1.5 and Manual.zip in English	http://www.cs.wvu.edu/~acm/gopher/Software/baycom/
Source for BayPac BP-2M	http://www.tigertronics.com/
TNC to radio wiring help	http://freeweb.pdq.net/medcalf/ztx/
ChromaPIX & ChromaSound DSP software	http://www.siliconpixels.com/
Timewave DSP & AEA products	http://www.timewave.com
International Visual Communication Association — a non-profit organization dedicated to SSTV	http://www.mindspring.com/~sstv/
XPWare — TNC software with sample download	http://www.goodnet.com/~gjohnson/
Auto tuner and other kits	http://www.ldgelectronics.com
TAPR — lots of info	www.tapr.org
Creative Services Software	www.cssincorp.com

Table 1. *The Infamous Chart — "Almost everything ..."*

Number 55 on your Feedback card

CALENDAR

Listings are free of charge as space permits. Please send us your Calendar item two months in advance of the issue you want it to appear in. For example, if you want it to appear in the February issue, we should receive it by December 31. Provide a clear, concise summary of the essential details about your Calendar item.

NOV 13

MONTGOMERY, AL The Montgomery ARC will host the 1999 Alabama ARRL Convention at the 22nd annual Montgomery Hamfest and Computer Show in Garrett Coliseum at the South Alabama State Fair Grounds, located on Federal Drive in the North Eastern section of Montgomery. Admission $5, free parking, all indoors, including the flea market. Flea market setup 3 p.m.–8 p.m. Nov. 12th, and 6 a.m.–8 a.m. Nov. 13th. Doors open to the public 9 a.m.–3 p.m. CST. VE exams on-site beginning at 8 a.m. Bring original and a copy of your current license, picture ID and $4. Talk-in on 146.24/.84, W4AP. Ragchew 146.32/.92 (with phone patch, *up/#down), 147.78/.18, 449.50/444.50. Flea market reservations required to ensure table. Tailgaters welcome, $5 per vehicle space. For more info write to *Hamfest Committee, c/o 2141 Edinburgh Dr., Montgomery AL 36116-1313;* or phone *Phil at (334) 272-7980 after 5 p.m. CST. E-mail [wb4ozn@worldnet.att.net].* Visit the Web site for late-breaking news and events, *[http://jschool.troyst.edu/~w4ap/].*

NOV 13–14

FT. WAYNE, IN The 27th Fort Wayne Hamfest & Computer Expo will be held Nov. 13th and 14th at the Allen County War Memorial Coliseum Exposition Center. Sponsored by the Allen County Amateur Radio Technical Society. Hours: Saturday 9 a.m.–4 p.m. EST; Sunday 9 a.m.–3 p.m. EST. No advanced ticket sales. Admission $5 at the door only. 11 years old and under free with an adult. Coliseum parking, $2 per vehicle. Talk-in on 146.88(-). New and used ham dealers. Computers and software. Forums and meetings. Flea market tables, 8-ft., $20 each. Premium tables, 8-ft., $40 each. $27.50 for electricity (110V 20A). For info or table orders, send an SASE to *ACARTS/Fort Wayne Hamfest, P.O. Box 10342, Fort Wayne IN 46851.* For more table info, call *(219) 483-8163.* For general info, call *(219) 484-1314.* Visit the Web site at *[http://www.acarts.com].*

NOV 19–20

OCEAN SPRINGS, MS The West Jackson County ARC will hold its annual Hamfest/Swapfest at the St. Martin Community Center north of Ocean Springs. The hamfest will be open to the general public from 5 p.m.–9 p.m. on the 19th, and 8 a.m.–2 p.m. on the 20th. Admission will be $2 per adult or $4 for an entire family. Take Exit 50 South from I-10 at Ocean Springs. Follow Hwy. 609 to the second light. Turn right on Lemoyne Blvd., and the Community Center is 1 mile on the right side. Free parking. RVs may park overnight if they are completely self contained. There are several motels in the vicinity of Exit 50. 8-ft. tables are $5. Advanced deposits are required for sales table reservations. Talk-in on 145.11(-) MHz, N5OS. VE exams will be held at 11 a.m. Saturday. Bring photo ID, the original license, and a photocopy of that license. The testing fee is $6.45. Contact *Phil Hunsberger W9NZ, 1207 Lancelot Lane, Ocean Springs, MS 39564, tel. (228) 872-1499; or call Stan Hecker N5SP at (228) 875-0222.*

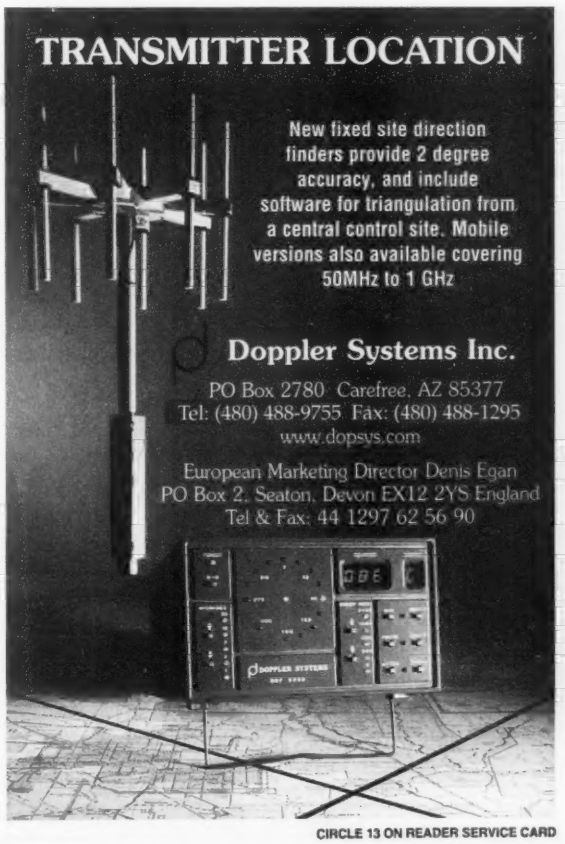
NOV 20

GOLDEN, CO The 1999 RMRL Hamfest will be hosted by the Rocky Mountain Radio League, Inc., November 20th, 8 a.m.–2 p.m., at Jefferson County Fairgrounds, 15200 W. 6th Ave., Golden CO (Indiana Exit from 6th Ave.). Talk-in on 144.62/145.22 MHz. Admittance $4 per person; tables $10 in advance or at the door. VE exams, ARRL forum. Contact *Ron Rose NØMQJ, (303) 985-8692; E-mail [nØmqj@arrl.net].*

NEWTONVILLE, MA The Waltham ARA/1200 RC Auction and Ham Social will be held Saturday, Nov. 20th on the 2nd floor of the Newton Masonic Hall, 460 Newtonville Ave., Newtonville MA (the corner of Walnut St. and Newtonville Ave., across from the Star Market). Metered parking on the streets. Masonic Hall lot reserved for other occupants of the building. Stay away from the Star Market lot, or they'll tow your vehicle. There is free parking in the municipal lot a block away. Admission $2. Talk-in on 146.64(-) Waltham rptr. Seller check-in starts at 9:30 a.m. For directions and further info, visit the WWW site at *[http://ourworld.compuserve.com/homepages/emayer/auction.htm],* or contact *Eliot Mayer W1MJ, (617) 484-1089; E-mail [w1mj@amsat.org].*

NOV 27

EVANSVILLE, IN The 7th Annual E.A.R.S. and Ham Station Evansville Winter Hamfest will be held Sat., Nov. 27th, 8 a.m.–2 p.m.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be indebted to Joe. He doesn't have a clue, I am sure, what honors you faithful readers will shower on him once you are aware of the golden "find." I didn't add the URL to the chart. If you think that is a serious deletion, let me know. About ten E-mails will set me straight.

If you have questions or comments about this column, E-mail me [jheller@sierra.net]. I will gladly share what I know or find a resource for you. For now, 73, Jack KB7NO. 73

CST at the Vanderburgh Co. 4-H Center Fairgrounds Auditorium. Free parking. Free tailgating. Commercial dealers. Indoor flea market. Setup begins at 6 a.m. Central Time. Talk-in on EARS Wide Area Rptr. Network, 145.150(-) Evansville/146.925(-) and 443.925(+) Vincennes. Alternate: EARS Rptr. 145.110(-). Please use 107.2 CTCSS on all frequencies listed. 8 ft. tables $8 each. Wall spaces $10. Admission $5. New and used equipment will be featured. Visit with representatives of Icom at the Icom Forum at 11 a.m. For more info or table reservations, contact *Neil WB9VPG at (812) 479-5741;* or write to *EARS, 1506 S. Parker Dr., Evansville IN 47714. E-mail to [EARSHAM@aol.com].* The hamfest Web site is at *[http://members.aol.com/earsham/].*

SPECIAL EVENTS, ETC.

NOV 11

ALBUQUERQUE, NM Station N5VA will operate from the Veterans Medical Center on Veteran's Day, Nov. 11th. Operation will be 16:00 UTC–04:00 UTC on 14.287, 21.325, 18.130 and 7.245 MHz, or as close to those frequencies as possible. For a 9" x 11" certificate, please send a large SASE to *VA Medical Center, 1501 San Pedro Dr. SE 117D, Albuquerque NM 87108 USA.*

NOV 13–14

CEDAR RAPIDS, IA The Cedar Valley ARC will operate Special Event Station WØGQ 1300Z–2300Z, to commemorate 50 years of CVARC. Operation will be from the club station at Kirkwood Community College (Jones Hall). Frequencies will be located ± QRM around 7.035, 7.135, 7.235, 14.035, 14.235, 21.035, 21.135, 21.235, 28.135 and 28.335, at the operator's discretion. Certificates will be issued for contacts made with WØGQ. Send a self-addressed-stamped 9x12 envelope for an unfolded certificate; or QSL for a special 50th Anniversary QSL card. For more info contact *Jim Covington at [aaØxj@ia.net].*

NOV 20–22

VALE ISLAND, NORTHWEST TERRITORIES In celebration of the 5th Anniversary of the US Islands (USI) awards program, VE8JR will be active exclusively around 28.495 from Vale Island. Operation will take place during the ARRL November Sweepstakes Contest, Nov. 20th–22nd. 17m activity will also take place from Northwest Territories and Alaska after the contest. *QSL Mgr. KL7JR (CBA).* Web site at *[http://www.eng.mu.edu/~usi].*

DEC 7

MESA, AZ The East Valley Amateur Radio Group, WA7USA, will commemorate the Battleship *USS Arizona* 1500Z–2400Z on the frequencies 14.240, 21.340, and 28.340 MHz. Stations contacted may request a certificate by sending a QSL card and a 9 x 12 SASE to *EVARG, 3264 E. Carol Ave., Mesa AZ 85204-3245 USA.*

DEC 10–11

BETHLEHEM, IN The Clark County ARC will operate W9WWI, 1500Z Dec. 10th–2200Z Dec. 11th in celebration of the Christmas season. Operation will be on General 75, 40, and 20 meters. QSL with an SASE for a certificate to *CCARC, 1805 E. 8th St., Jeffersonville IN 47130 USA.*

DEC 31–JAN 2

AUSTIN, TX The 3M ARC (W3MRC) of Austin TX will operate using the special callsign W2T, 1100 UTC Dec. 31st–2400 UTC Jan. 2nd. SSB operation will be on 7.230, 14.340, 21.410 and 28.350 MHz. For a certificate, send a large SASE with 2 stamps (see Web site for details). Send QSL to *3M ARC—W3MRC, A147-5S-03, 6801 Riverplace Blvd., Austin TX 78726-9000.* See *[www.qsl.net/w3mrc]* for more info. 73

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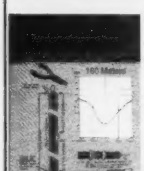

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NEVER SAY DIE

continued from page 6

had my first Arab horse. I'd done that.

How do you decide what business field to enter? Well, I said to find something that looks like it would be fun. Serendipity will step in to open opportunities for you, if you let it. It always has for me. For instance, I got to be good friends with Ken Grayson W2HDM, my surplus conversion editor. Ken had an MGB sports car and was having fun going on car rallies. So I looked over the sports cars and decided on a Porsche Speedster. After a couple of drives in my new Porsche, Ken sold his MGB and bought a Porsche, too.

I got all involved with rallying. Wow, was that fun! The idea is to follow a set of not too clear instructions and drive at exactly the given speed over a given route. Every so often there is a checkpoint (often hidden), timing you as you go by. You lose one point for every hundredth of a minute you're early or late. This means that you have to be armed with an exact odometer, a dependable stop watch, and a calculator.

Hundredths-of-a-mile odometers were available, but most of the stopwatches were not dependable enough for more than an hour or so. We needed better watches that would be accurate to a half second a day. That meant more jewels in the movement and compensation for temperature changes.

Most rallies were only four or five hours long, but some were overnight or even 1000-mile events, so a good watch was important. I found that one of the best was made by Hanhardt in Schwenningen, Germany. So I visited the factory and arranged to have them make some special 17-jewel rally watches that I imported and sold via small ads in the car magazines.

A cute little hand-held calculator was being made by Curta in Liechtenstein that was ideally suited for rally use. I'd been using a big

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Monroe desk calculator, mounted on a stand between the navigator's legs and powered by an AC inverter in the back seat, so something the size of a small pepper grinder was a great improvement. Yes, I went to Liechtenstein and talked with the prince, who owned the factory. The calculators were mainly used for currency conversions by European banks and change offices. The factory was mostly automated, but with women doing the assembly and testing the units. I set up an agreement to import the Curtas and added them to my rally catalog. I sold hundreds of them, making a nice profit on the deal.

The one other thing that rallyists needed was a better set of time-speed-distance tables. The ones on the market filled a notebook and were difficult to use. So I figured out a much better system that required just one page of tables. Soon my customers were winning all the rallies.

Since my products were aimed at a very narrow interest group, it was easy to reach them through small ads in the sports car magazines.

What I'm trying to get across is that there are opportunities everywhere if you just keep your eyes and ears open. Rally equipment wasn't a huge business, but it was a great sideline while I was mainly publishing *73* magazine. And it sure was a lot of fun.

Working for other people sucks, so start thinking of a business that would be fun and that you could start small and grow. When you're your own boss, you'll have the freedom to travel and do things — as I have.

Over 40, Over the Hill

Hmm, are you still working for someone else? If you're over 40, you could be in trouble. Companies are waking up to the fact that younger workers work harder and longer, are more adaptable, are eager to learn, and cost a lot less than older workers. The days of working for a company until retirement at 55 are blowing away. The day of getting pay increases on a regular basis are blowing away. Heck, I'm old enough to remember when the retirement age was 65!

Now, if you're over 55, you are unemployable. If you are over 40, and looking for work, you're going to find that there's not much available, and you'll probably have to take a 40% or more pay cut.

Yes, this is unfair. But I've had an awful lot of employees over the years, so I can sympathize with companies looking for young workers. I tried hiring older people, but I found them, no matter their years of experience, to be less adaptable to our work and less productive, so I found myself looking for eager young people I could train. Indeed, my greatest employment disasters were when I brought in high-priced, experienced managers.

Of course, if you're self-employed, you've got a job for as long as you like, and never mind 40, 55, or even 65, for that matter.

Recent studies have shown that there is little difference in job performance between people who have five or 20 years of experience, which brings into question the old idea of annual raises that gradually price older employees out of their jobs.

So, if you are a working stiff, how long is it going to take for the light to go on that security lies in running your own business, not working for someone else? Blue collar workers are seeing their jobs move offshore. Managers are being replaced by information systems and younger, less expensive people. And it's only going to get worse!

Megamergers mean a megaloss of jobs, and it isn't the younger people who are getting axed. Working for a large corporation is increasingly chancy when it comes to retirement benefits. Gratitude, the least felt of all human emotions, is particularly in short supply when it comes to business.

How many of you remember retirement parties?

Stupidity

Einstein said: "The difference between genius and stupidity is that genius has its limits."

Neo Colleges

What should colleges be teaching instead of feel-good fluff courses? Please let me know if you've heard of any college that's teaching about shipping products. Like the best packaging to use and how to shop for it. The pros and cons of shipping by railroad, truck, ship, airplane, UPS, USPS, and so on. If you're importing a product from, say, Taiwan, how would be the best way to have it shipped? Do you use bulk shipments on a pallet or in containers? How important is time for you? How about the survival of delicate products? Are the temperatures during shipment a concern?

Just understanding the many post office rates is a challenge.

When time is critical, which of the "overnight" services are best?

Well, you get the idea. No matter how big or small a company, someone should have an understanding of shipping and mailing alternatives. If you leave it up to a clerk you're going to pay heavily for their ignorance. And keep right on paying.

Auto Whoopee

You've never heard of an auto whoopee? Good grief! These were wooden structures built like a roller coaster ride that you could drive on with your car (25¢). There was one down near Central Airport in Camden (Philadelphia's airport) when I was a kid. In the off hours, when it was closed, we kids used to ride our bicycles on it. Bicycle whoopee.

During the summer, when I was eight, I used to get some of my friends to come down

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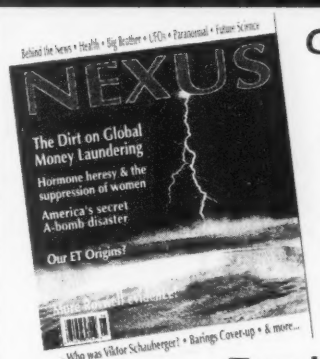
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to the airport with me on their bicycles and my dad, who was either checking out planes for certification or logging hours, would take us up for rides. And that usually included flying upside down, which was an experience in an open cockpit plane that none of 'em will ever forget. My dad designed, built, and managed the airport, so I was around planes a lot — and he often had pilot friends over for dinner.

This was around 1930, when even our local movie theater in Pennsauken had several acts of vaudeville, complete with a live orchestra, every Saturday. That's when miniature golf got started and soon was everywhere. That's when my mother taught me to swim in the pool across the street from the airport. I immediately found I preferred swimming underwater and seeing how long I could hold my breath. I'm still at it, but now I use scuba equipment so I can stay down longer and go much deeper.

Ask any old-timer about auto whoopees. Ask 'em about how there used to be vacant lots all around their neighborhood where they used to play.

Dribbler

One of our *73* readers, Bob Nickerson, has racked up several world records. Like for dribbling four basketballs simultaneously (at the same time, all at once) for as long as five minutes and juggling three balls while shooting 20 consecutive baskets in one minute, according to the *Guinness Sports Record Book*. Bob also sent a couple pictures of him juggling three hatchets while balancing an axe on top of his head. Oops!

With so few people taking the time to build skills or in some way stand out from the crowd, I really enjoy hearing about people who have.

While You Were Sleeping

Your Congress has been busy while you've been diverted with Monica and other things of far greater interest — busy passing out money (your money, by the way — money you presumably loaf hard for between smoking breaks) or giving tax breaks (which are the same thing) to subsidize things ranging from shipbuilding, coal research, the sale of US weapons overseas, peanut farming, helping to buy crop insurance for tobacco (gee, thanks a million!), building roads into national forests for the timber industry, selling minerals on public lands at bargain basement prices, providing cut rate electricity for businesses like casinos, helping shippers use inland waterways, bailing out banks with loans gone bad in foreign countries, and endless more corporate welfare. All to the tune of over a third of a billion a day! No wonder so many people have to work two jobs to make ends meet.

I love reading about the government helping to pay for Levi Strauss to open a plant in Turkey and then paying unemployment to the 6,400 workers in this country whose jobs had been eliminated.

Then there are the export subsidies, and this is a beaut. By opening a paper-shuffling office in the Virgin Islands or some other Caribbean vacation spot, corporations are able to avoid export taxes to the tune of a couple billion dollars a year. Unfortunately, the boards of directors of these corporations are forced to attend a yearly meeting at the export site.

When I was on the board of a billion dollar corporation we had directors' meetings in places like Beijing and Sydney, all expenses paid. In Beijing, we stayed at the Emperor's Guest House complex and enjoyed three royal meals a day. I sure do want to thank you for helping to pick up the tab and making my life more exciting.

Then there's the Export-Import Bank, set up in 1934 as a measure to help get us out of the Depression. Recent reports of this outfit show them spending $51 billion of your money a year to subsidize American exports, mostly for about ten companies. Boeing alone had subsidized sales of $11 billion to some 30 countries. The rationale was that this would create more American jobs, but we have fewer people working in manufacturing today than ten years ago. And more in government than in manufacturing.

Well, that's just a sampler. There are some well-researched books reviewed in my $5 *Secret Guide to Wisdom* that cite an endless array of other government fiascoes and crooked schemes, all of which are paid for by you.

John Campbell

The Star Wars furor (and major disappointment) produced a very perceptive article by Oliver Morton in *The New Yorker* (5/17/99) on the genesis of Lucas' Galactic Empire series. Well, it was all about people I knew personally. Some were good friends.

Morton explained how John W. Campbell Jr. (W2ZGU) brought science fiction into maturity in the late 1930s and 1940s. I got to know John in the 1950s and we were good friends. A lunch with John was an exciting experience, with the conversation going from Hieronymus machines to basement nuclear bomb making. John stretched my grasp of the chemistry, physics, and psychic frontiers. It was like being on an intellectual roller coaster ride, and as exciting.

The ISSSEEM (Subtle Energies) journal has recently reprinted some of John's old editorials from *Analog*, showing how prescient they were.

As I've explained endlessly, it was John's long and fascinating editorials that encouraged me to emulate him when I first started publishing in 1951. And I've never stopped.

Morton also mentioned A.E. Van Vogt, who was also a very good friend of mine. He and his wife Mayne were superb Dianetic auditors and they helped me through the difficulties of my first divorce. Well, the first is always the most traumatic.

I met and had dinner with Azimov, but we never hit it off as friends. He was too closely surrounded by a protective clique, and too busy loudly talking to be approachable.

Arthur C. Clarke, another of Campbell's stars, is a cold fusion fan, so we've been corresponding and he's been getting my journal.

I never got to meet Heinlein, but his brother is a ham and we've been friends for years. Heinlein's *Stranger In A Strange Land* is reviewed in my wisdom guide as one of the all-time great science fiction stories.

L. Ron Hubbard was also mentioned. I also knew Ron personally and, early in the Dianetic days, he audited me. As I've mentioned before, he was a terrible Dianetic auditor.

Gee, I've had an interesting life! So what have I done that millions of other people didn't? Mostly it was keeping an eye out for interesting opportunities and then acting on them instead of staying in the normal rut of life — working at a job, family, ball games, TV.

When Campbell published Hubbard's article introducing Dianetics in his magazine in 1950, I read it. It made sense to me, so I bought the book and quickly started trying this new mental repair system out. It worked so amazingly that I quit a very good radio job and went off to learn more about Dianetics.

The big difference, I guess, is that I grab opportunities and most people don't.

When I'm a guest on the Art Bell show, about one in a thousand listeners sends for my book catalog. 99.9% of the listeners thus have passed up the opportunity to get over their chronic illnesses and add many years to their lives. And then only about 20% of those getting my catalog order my books. 80% procrastinate and miss the opportunity. 99.98% of the listeners have passed up the opportunity of their lives.

When I hear an interesting guest on the Art Bell show, see an article in a magazine, or get a clipping from a fan, I order the referenced book, read it, and follow up on the subject. Yes, this keeps me busy. But I love learning new

things and seeing how they tie in with what I've learned from other sources. All this opens endless opportunities to start new businesses—and for my writing. Maybe you've noticed.

If you have any suggestions on how I can get more people off their big fat duffs, please advise.

Connections

You, I, and everyone else have allowed Congress to gradually increase our taxes, year by year, decade by decade, from the 2% of our salaries 90 years ago, when the income tax was started, to over 50% today. Well, it's fun spending money — particularly when it isn't your money. So we have been electing and then re-electing politicians who have been having a great time spending our money, and then taxing us further so they can spend even more.

In my editorials, I've written about the many unbelievably wasteful programs we've allowed Congress to enact. Like the "War on Drugs," which has cost trillions and has accomplished absolutely nothing. Like the "War on Poverty," which has only enriched the government bureaucracy, and hasn't done spit when it comes to having fewer poor.

One result of this spending spree has been the need for both parents to work just to make enough money to support both their families and the government. Two now bring home what one used to. And this has forced parents to baby farm out their kids to day care centers and nursery schools, a good start toward dumbing them down. It also has put a big strain on husband and wife relations, contributing to the escalating divorce rate.

The family model for all of recorded history and from then on back has had the mother raising the children, while the father did the hunting, which today we call work. Go to the library and read any book you can find about primitive cultures and you'll find that in every one the mother's main responsibility was raising the children.

With what we've learned recently about how children develop, we now know enough so that we could provide day care centers which would help children to grow even better than they might at home — by providing resources which, so far, are not easily available for home teaching. I suspect that some of this vacuum will be filled via the Internet before long — for example, by providing foreign language instruction for children 1–3 years old, when they have no problem in learning to think and can speak accentlessly in almost any number of languages, and without confusing them.

Congress has had a ball taxing and spending your money. They've built a huge government structure, and gradually taken away more and more of your freedoms.

A young child needs the love and attention of a mother, not to be parked in front of a TV with 20 other kids and made to watch Sesame Street or Mr. Rodgers. Or the Teletubbies. Young children are programmed to want to learn. They want to explore, to see, to taste, to feel everything. So we pen them in until this annoying phase passes. Permanently.

Raising children is the most important and difficult work there is for a mother. Unfortunately, since most baby boomer mothers have had to go out and work, today's new parents have no mothering experience to pass along to their babies. And we wonder about the tsunami of attention deficit disorders and hyperactivity, which we "solve" with Valium, Ritalin, Prozac, Luvox, Zoloft, Paxil, Effexor, or Serzone, and never mind the side effects.

I once knew a beautiful young girl who was raised on breakfasts of white toast, grape jelly, and coffee. By the time she was 22 she had to be committed to the state hospital for the insane.

Delinquents

As I was reading Dr. Weston Price's *Nutrition and Physical Degeneration*, a 60-year-old book which is still in print, and well deserves to be, my ideas about what's gone wrong so that kids are killing kids were confirmed. I bought the book because Dr. Price was a pioneer in the nutrition field, and I'd read his *Degeneration —› Regeneration* many years ago and was very impressed by his research. He showed how destructive sugar was to the endocrine system — how that even a teaspoon of refined sugar would upset the calcium-phosphorus ratio in the blood, as well as the immune system, for a whole day, contributing to arthritis and other immune-system disorders.

Dr. Price spent years visiting people living in remote areas of the world, studying their health and teeth. What he discovered was amazing. He found that groups living on their native foods were incredibly healthy, lived long and productive lives, and had perfect teeth. They had no need for doctors or dentists.

But then, when the outside world reached them and they were introduced to sugar and white flour products, their teeth started having cavities, their jaw structures changed, their health disintegrated, and they started dying at much earlier ages. But sugar and white bread are addictive, and the results of the diet change were so slow in happening that no one noticed the connection.

He visited people early in this century in the remote islands off the Scottish coast, people living in a Swiss village that was cut off from the rest of the country, South Sea islanders, Eskimos, and so on. The story was the same everywhere, and the photos in this well-illustrated book prove what he'd discovered.

He also found that crime was virtually unknown to these people before sugar and white bread were introduced. A generation later kids were doing criminal things. Primitive tribes needed no police.

I suspect, if we could eliminate sugar and white bread from our American diet, the inner city gangs would disappear and crime would be an anomaly instead of the meat of most newspapers and TV shows. But we're so addicted to pie, ice cream, and candy that I doubt anything can be done, so we'll just have to get used to kids killing kids and stop bitching about it. We'll have to build more prisons and spend more to house the criminals we're making. Well, it's good business for lawyers, judges, the courts, police, prison guards, and so on down the line. We wouldn't want to put millions of lawyers out of business, now would we? Having no other skills, we'd have to increase our welfare system's cost. Judges, at least, could go on TV for a while and make a buck.

The 524-page 6th edition by Dr. Price is $20, ISBN 0-87983-816-7, Keats Publishing, Box 876, New Canaan CT 06840. Dr. Price is not a great writer, but his data is unassailable and fascinating.

The next time you order apple pie and ice cream, remember that it is shortening your life as surely as smoking a cigarette, and that if you eat this crap before you conceive a child it is going to some degree to deform your child, physically and mentally. It's no wonder that kids are going berserk and their grades are plummeting.

Night Lights

An article in *Nature* (May 13th) reported a strong correlation between nearsightedness in children with the use of night lights when they were babies. The same phenomenon has been observed in chicks, so it was no big surprise.

Well, it makes sense that night lights could affect children. Up until Tommy Edison invented the electric light people tended to go to sleep when it got dark, so this is a pattern which has been embedded in the deepest and oldest part of the brain, what's called the reptilian

Continued on page 61

PROPAGATION

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November 1999						
SUN	MON	TUE	WED	THU	FRI	SAT
	1 G	2 G	3 G	4 G	5 G-F	6 F-P
7 P	8 P	9 P-F	10 F	11 F	12 F	13 F-P
14 P-F	15 F	16 F	17 F-G	18 G	19 G	20 G
21 G	22 G	23 G-F	24 F-P	25 P	26 P	27 P-F
28 F	29 F	30 F				

November

November will exhibit variable DX conditions on the HF bands, ranging from Poor to Good, as shown on the calendar. The days 1st–5th and 18th–22nd are expected to provide GOOD DX paths to most areas of the world, but signals may not be quite as strong as during the best days of September or October, due to the reduced E- and F-layer ionization at the onset of winter in the northern hemisphere.

POOR conditions for DX are expected on the 7th and 8th and again on the 25th and 26th, with the remaining days of the month trending between the extremes.

Those with good ears and good receivers will make the best of the FAIR conditions between the 10th–12th; the 15th and 16th; and again from the 28th–30th.

Atmospheric storms and other geophysical disturbances are also likely during the 7th and 8th and again on the 25th and 26th.

Happy Thanksgiving!

December

And Season's Greetings!

DXers can look forward to reasonably Good (G) radio propagation between the 9th and 17th; Fair (F) DX on the 19th, 20th, 23rd, 24th, and 28th; and Poor (P) or Very Poor (VP) propagation, with an upset to active geomagnetic field and a disturbed ionosphere on the 3rd through the 6th, and again on the 29th. The remaining days show trending conditions (see calendar).

Although winter DX propagation on the HF bands above 20 meters is generally poorer than in the Spring or Fall, because excitation of the E and F layers in the ionosphere is less, the solar flux index is expected to be up around the 200 level at this part of the sunspot cycle and DX propagation ought to be much better than it was last December.

Please pay particular attention to weather conditions December 3rd through the 6th, and again on or about the 30th, when severe winter storms could occur in parts of the United States. Other geophysical disturbances are also possible here and elsewhere in the world during these three or four days, so be prepared.

Forecasters are undecided about the anticipated occurrence of Cycle 23's sunspot maximum. Some predict it will occur sometime in the year 2000, while others — including

EASTERN UNITED STATES TO:												
GMT:	00	02	04	06	08	10	12	14	16	18	20	22
ALASKA	15/17	20/30	-	-	-	-	20/30	20/30	-	-	-	15/17
ARGENTINA	20/30	20/30	40	40	-	-	-	-	-	10/12	10/12	15/17
AUSTRALIA	15/17	-	20/30	-	-	40	20/30	20/30	-	-	-	15/17
CANAL ZONE	15/17	20/30	40*	40*	40	-	20/30	20/30	20/30	10/12	10/12	15/17
ENGLAND	40	40	40*	40	-	-	20/30	15/17	10/12	10/12	20/30	20/30
HAWAII	15/17	20/30	20/30	40	40	40	20/30	20/30	-	-	10/12	10/12
INDIA	-	-	-	-	-	-	20/30	20/30	-	-	-	-
JAPAN	15/17	20/30	-	-	-	-	20/30	20/30	-	-	-	15/17
MEXICO	15/17	20/30	40*	40*	40	-	20/30	20/30	20/30	10/12	10/12	15/17
PHILIPPINES	-	-	-	-	-	-	20/30	20/30	-	-	-	-
PUERTO RICO	15/17	20/30	40*	40*	40	-	20/30	20/30	20/30	10/12	10/12	15/17
RUSSIA (C.I.S.)	40	40	-	-	-	-	-	15/17	15/17	20/30	-	-
SOUTH AFRICA	20/30	-	-	-	-	-	-	-	15/17	15/17	10/12	20/30
WEST COAST	40	80	-	-	-	-	-	20/30	20/30	20/30	15/17	40
CENTRAL UNITED STATES TO:												
ALASKA	15/17	-	-	-	-	-	-	-	-	-	-	15/17
ARGENTINA	15/17	20/30	20/30	40	40	-	-	-	-	-	10/12	15/17
AUSTRALIA	15/17	20/30	20/30	20/30	-	40	80	-	-	-	-	15/17
CANAL ZONE	15/17	20/30	20/30	40*	40*	-	-	15/17	15/17	10/12	10/12	15/17
ENGLAND	-	40/80	40/80	-	-	15/20	15/17	15/17	20/30	20/30	20/30	-
HAWAII	15/17	20/30	20/30	40	40	40*	80	20/30	-	-	10/12	15/17
INDIA	-	-	-	-	-	-	-	20/30	-	-	-	-
JAPAN	15/17	-	-	-	-	-	-	-	-	-	-	15/17
MEXICO	15/17	20/30	20/30	40*	40*	-	-	15/17	15/17	10/12	10/12	15/17
PHILIPPINES	15/17	20/30	-	-	-	-	-	20/30	-	-	-	-
PUERTO RICO	15/17	20/30	20/30	40*	40*	-	-	15/17	15/17	10/12	10/12	15/17
RUSSIA (C.I.S.)	-	-	-	-	-	-	-	20/30	15/17	20/30	-	-
SOUTH AFRICA	20/30	-	-	-	-	-	-	-	-	15/17	15/17	20/30
WESTERN UNITED STATES TO:												
ALASKA	10/15	15/17	15/17	20/30	20/30	20/30	40	40	-	-	-	15/17
ARGENTINA	10/15	20/30	20/30	40-	-	-	-	-	-	-	15/17	10/15
AUSTRALIA	10/12	15/17	15/17	20/30	20/30	40-	40	40-	20/30	20/30	15/20	15/17
CANAL ZONE	20/30	20/30	40/20	40/20	40	-	-	20/30	15/17	15/17	10/12	10/12
ENGLAND	-	-	-	-	-	-	-	-	-	15/20	15/20	-
HAWAII	10/12	15/17	20/15	40	40*	40*	40	40	-	20/30	20/30	20/30
INDIA	15/20	15/20	-	-	-	-	-	-	20-	-	-	-
JAPAN	10/15	15/17	15/17	20/30	20/30	20/30	40-	40-	-	-	-	15/17
MEXICO	20/30	20/30	40/20	40/20	40	-	-	20/30	15/17	15/17	10/12	10/12
PHILIPPINES	15/20	15/20	-	20/30	-	40-	40-	-	20/30	20/30	-	15/17
PUERTO RICO	20/30	20/30	40/20	40/20	40	-	-	20/30	15/17	15/17	10/12	10/12
RUSSIA (C.I.S.)	-	-	-	-	-	-	-	-	20/30	-	-	-
SOUTH AFRICA	20/30	20/30	-	-	-	-	-	-	-	15/17	15/17	20/15
EAST COAST	40	80	-	-	-	-	-	20/30	20/30	20/30	15/17	40

Table 1. November Band-Time-Country chart.

December 1999						
SUN	MON	TUE	WED	THU	FRI	SAT
			1 G-F	2 F-P	3 P-VP	4 VP
5 VP-P	6 P	7 P-F	8 F-G	9 G	10 G	11 G
12 G	13 G	14 G	15 G	16 G	17 G	18 G-F
19 F	20 F	21 F-G	22 G-F	23 F	24 F	25 F-G
26 G	27 G-F	28 F	29 F-P	30 P	31 P-F	

this writer — tend to expect it sometime in 2001. Contrary to earlier expectations (and hopes) among radio amateurs, Cycle 23 is likely to rank as less than average, or poor, compared to previous recent cycles.

Nevertheless, the gradual decline of a cycle takes place over a period of five or six years until its sunspot minimum, so we still have a lot of good DX to look forward to in Cycle 23.

Remember to check the bands above and below the suggested ones for possible DX surprises. It's often a good idea to park your receiver on a seemingly unused frequency and just wait. A DX station is very likely to pop up before any one else hears him, and you can snag a good catch.

Please note that on the Band-Time-Country charts, (*) indicates a possible 80 meter opening, and (-) or (open) indicates a difficult path. Good hunting! W1XU/7. 73

EASTERN UNITED STATES TO:												
GMT:		02	04	06	08	10	12	14	16	18	20	22
ALASKA	15	20					20	20				15
ARGENTINA	20	40	40	40			20	15	15	10	10	15
AUSTRALIA	15	20	20		40	40	40			20	20	15
CENTRAL AM.	20	20	20	20	20	20	20	15	10	10	15	15
ENGLAND	40	40	40*	40*		20	15	10	15	20	20	
HAWAII	15	20					20	20	20	10	10	15
INDIA							20	20				
JAPAN	15	20					20	20				15
MEXICO	20	20	20	20	20	20	20	15	10	10	15	15
PHILIPPINES							20	20				
PUERTO RICO	20	20	20	20	20	20	20	15	10	10	15	15
RUSSIA (C.I.S.)							20	15	20	20		
SOUTH AFRICA	20	40*					20	10	10	10	15	20
WEST COAST	15/20	20/40	80	160	160	160				10	10	15
CENTRAL UNITED STATES TO:												
ALASKA	15							20				15
ARGENTINA	20	20	20	40	40		20	20	15	10	15	15
AUSTRALIA	15	20	20				40				15	10
CENTRAL AM.	15	20	40	40*	40*		20	15	10	10	10	15
ENGLAND	40	40	80					20	15	15	20	40
HAWAII	15	20		40	40	40*	40*	20	20	15	10	15
INDIA								20				
JAPAN	15							20				15
MEXICO	15	20	40	40*	40*		20	15	10	10	10	15
PHILIPPINES	15	20						20				15
PUERTO RICO	15	20	40	40*	40*		20	15	10	10	10	15
RUSSIA (C.I.S.)								20	15	20		
SOUTH AFRICA	20	40						15	10	10	15	20
WESTERN UNITED STATES TO:												
ALASKA	10	15	20				40	40	40			20
ARGENTINA	15	20		40	40			20		10	10	15
AUSTRALIA	10	15	20	20			40*	40*	20	20	15	15
CENTRAL AM.	15	20	20					20	15	10	10	10
ENGLAND	20	40	40						15	15	20	20
HAWAII	10	15	20	40	40	40		20	20	15	15	10
INDIA		15	20						20			
JAPAN	10	15	20				40	40	40			20
MEXICO	15	20	20					20	15	10	10	10
PHILIPPINES	10	15/20	15/20			40	40	40		20		20
PUERTO RICO	15	20	20				40	40	40			20
RUSSIA (C.I.S.)									20	20		
SOUTH AFRICA	20	20							15	10	15	15
EAST COAST	15/20	20/40	80	160	160	160				10	10	15

Table 2. December Band-Time-Country chart.

NEVER SAY DIE

continued from page 59

brain. You mess with deeply embedded life patterns at your risk. Oh, the many ways we are unknowingly deforming our children!

If parents were aware that smoking, even before conception, would to some degree deform their children, would that be enough to get them to stop? And the same goes for eating sugar, white flour products, and growth hormone and antibiotic-loaded milk and beef. These poisons all affect the sperm and ova.

"But Mommy, I'm afraid of the dark!" "All the better for the bogey man to sneak out from under your bed and get you, my dear."

And if that isn't enough, if you'll read about melatonin, you'll find that even the light when you go to the bathroom at night will stop your body from making melatonin. When the light hits your eyes and the message goes to your system that it must be morning, so stop making melatonin.

So what? Spring $7 for Dr. Reiter's Bantam book, *Melatonin*, and read for yourself. This stuff, normally made in the pineal gland, helps you sleep sounder, combats jetlag, counteracts stress, fights off viruses and bacteria, plays a role in how long you live, and even helps protect you from cancer and heart disease. So don't screw around with your melatonin factory by leaving a light or your TV on at night. You may also want to take some supplementary melatonin just before going to bed at night, since as you get older your melatonin factory gets lazy, contributing to your ability to die sooner than might otherwise happen.

The Tesla Society

The International Tesla Society in Colorado Springs seemed to be doing well for many years, hosting some fascinating yearly conferences. I attended three of 'em and was a speaker on cold fusion developments and atomic physics at one. Their book shop was a treasure chest of interesting books. They made far more money on me at their book store during their conferences than from the conference fees. They always had a ham station set up in the hosting hotel lobby, with plenty of hams attending their conferences. Though they attracted a lot of phonies as speakers, they also managed to find some who had valuable information, helping me to make some wonderful contacts.

So I was surprised and disappointed when the Tesla Society stopped sending magazines and disappeared, with no more conferences announced.

Then came an announcement of an Exotic Research conference in Seattle last March, listing quite an array of speakers. I was disappointed not to see me listed, but them's the breaks. I really enjoy talking to a room full of people, and the bigger the room, the better. Heck, I haven't the slightest qualms about talking to Art Bell's millions of listeners. On the other hand, traveling to Seattle for a conference would take almost a week out of my life, putting me one more week behind in my work. And all that to talk with a couple hundred or so attendees.

On the plus side I'd get to listen to some interesting talks and make some fascinating friends. And meet some turkeys.

Then an identical announcement came in for a conference in Mesa (AZ) next July 27–30th. Same cast of characters. Hmm. So I called and found that there were some postal problems which resulted in the Seattle conference being canceled. You can get the details on where and who will be speaking about what from Exotic Research, Box 411, Stanfield AZ 85272, or call 520-424-3581.

I asked what had happened to the Tesla Society and was told that they'd gone bankrupt and that Dennis Lee had bought their assets. I'd wondered what Dennis was doing these days. The last I'd heard he had been taking his magic act around the country selling

distributorships for his nonexistent products. My letters to him have gone unanswered. I did enjoy the video of him demonstrating his "inventions," but since they seemed to defy any scientific explanation, I was skeptical. I read his book which told about him being put in prison as a confidence man. Well, we'll see what comes of his Tesla Society purchase.

Enough Hours

This is about me. Well, hell, I keep asking the people who hear me on the Art Bell show to tell me something about themselves, so I'll share a little of my life with you.

My main problem is that there is so much to do and so few hours. There are so many books on my shelves that I haven't read yet, each one a treasure of information and ideas. Each one an adventure of the mind. Then there are the Dilbert books, which have me roaring with laughter.

I've got thousands of CDs that I want to listen to over and over again. The thrill of the Gottschalk Tarantella, the incredible beauty of Delius' music. Nirvana. The Offenbach cello concerto, which I've only played a thousand times so far. Talk about industrial strength stress reduction!

Oh, how I wish you could share with me the books, the music, and my walks in our north pasture, where every few days in the spring brings out a new array of wild flowers. The excitement of seeing the wild life—a dozen deer in our front yard, a couple of dozen wild turkeys going methodically across the pasture I can see over my Macintosh as I write, the wolf I spied from my bedroom window the other morning. Pheasants, raccoons, bears, elk, coyotes, buzzards, we've got 'em all.

There's the fun of writing. I have this need to teach, so I research things that interest me and then write about them—to share with you what I've learned. I try to make it entertaining, as teaching should always be. Oh, how I remember the struggle I had to stay awake in class as a teacher droned on. And the day the professor pointed to one of the students, "You! Wake up that man next to you!" He answered, "You wake him up, you put him to sleep," which got a huge laugh from the bored students and almost killed the professor with apoplexy.

Plant Growth

With the development of a rotary transducer in 1966, it became possible to measure plant growth to an accuracy of ± 0.001 inches. This made it possible to much more accurately measure the effect of thought on plant growth. The experiment was set up growing some rye seeds. The strip recorder showed that they were growing at a steady 0.00625 inches an hour. Olga Worrall, a well-known psychic who was 600 miles away, was called and asked to speed up the growth at a specific time. The strip had been steady until that time, when it suddenly went to 0.0525 inches an hour! The growth gradually slowed down over the next 48 hours, but it never went back to its original rate. Olga's thoughts accelerated the rye growth by eight times, just by concentrating her thoughts on it remotely.

If thoughts can affect plants that powerfully, I wonder what they can do for or to humans? Maybe there's more to voo-doo and witch doctors than just imagination and suggestion.

But you don't have to be a psychic to demonstrate the power of thought to influence plant growth. You can do it in your kitchen with some seeds planted in plastic cups of dirt. Your positive thoughts will accelerate the growth and your negative thoughts will slow it down.

Scientific Progress

Science *has* progressed, despite the best efforts of the scientific establishment to prevent it. At least two Nobel laureates have admitted that they lied about their proposed research work on their grant applications because they knew the peer review process would never allow them to pursue their real goals.

This peer review process has prevented most truly innovative papers from being published in the scientific journals. An article in the *JAMA* pointed out that "... some of the most distinguished of scientists may display sophisticated behavior that can only be described as pathological."

History supports the blindness of scientists when faced with something new, from Copernicus to Galileo, Darwin, Mendel, Ohm, Young, Harvey, Flemming, Wegener, Semmelweis, Pasteur, Lister, and so on.

The tomato was shunned in America for over 200 years after it was accepted in Europe because "everyone knew" it was poisonous.

The scientific establishment was horror-struck when Pons and Fleischmann, two respected electrochemists, held a press conference to announce cold fusion instead of submitting their paper to a peer-reviewed journal. Not being total dummies, P&F knew they'd just be wasting precious months going the peer review route, there being no peers in this new solid-state microfusion field, and the reaction they'd discovered was well known to be totally impossible.

When one of the pioneers in this new field, distinguished professor Ed Storms, opined that the transmutation of elements was involved in the generation of the excess heat, his colleagues at Texas A&M ganged up and tried to have him fired for suggesting such heresy. Witch burning is apparently still popular in Texas.

Magnets & Healing

I had an interesting letter from reader Rod Summit that I want to share with you. Rod was in a car accident several years ago which damaged his neck and back and left him in constant pain, making it extremely difficult to sleep without heavy narcotic medication. Then he heard about magnetic mattress pads and tried one. Within a few days he was sleeping without pain

Continued on page 64

June Contest Winners

Grand Prize Winner

John Dougus NØISL

Runners-Up

1. Tony Capelle N1TC
2. Bob Kerry NY1Y
3. William Thim N1QVQ
4. Ted Melinosky K1BV
5. William Miller Jr., MA
6. Gary Devlin N2VIP
7. Don Stoddard N8LNE
8. A. Albanowicz KU4HN
9. D.S. Burke W5DSB
10. Frank Lauri N2IX
11. John W. Bay, Jr. N3ULD
12. Shane Brady WB2WPM
13. David Freeman W4OLA
14. B. Artman KB3CLB
15. L. Edelstein W4JEM
16. J. Siomkajlo N3QJM
17. George Gaskill KD9EN
18. M. Martineau W1AYC
19. Milt Forsberg K9QZI
20. T. Hinkelman N8JKR
21. Mike Kitchen N8QES
22. Steve Adams KF4NAT
23. Karl Heil WD9BGA
24. W. Conlon K9KOD
25. Bill Fairley WA4TCC
26. J. Guzewicz W4IDC
27. Joklahr Keller WD8JPF
28. Sidney Gogel W2FUR
29. E. Sinclair KD4JUH
30. R. Mollentine WHØKKC
31. Max Holland W4MEA
32. Ed Rich W2SLW
33. Mike Leahan N9PQK
34. Tay Tambolas KZ3U
35. J. Schnieders N9IYI
36. Bill Vokac K9BV
37. J. Shaw KM5AD
38. Brian Lecuyer AA2QU
39. John Orton WA6BOB
40. G. Hopper KB7WSD
41. Greg Saville N7IDB
42. Ervin Sly W6ERV
43. David Nagel W9EXJ
44. M. Kazlauskas WA2NGT
45. Tony Padavich N9YPN
46. W. "Jim" Poulos WB6ZJA
47. H. Landsberg WB6MEU
48. Stan Podger VE3DNR
49. Chris D. Hill AB6FA
50. George White KB1NP

Wise Up!

Here are some of my books which can change your life (if you'll let 'em). If the idea of being healthy, wealthy and wise interests you, start reading. Yes, you can be all that, but only when you know the secrets which I've spent a lifetime uncovering.

.....Wayne

The Bioelectrifier Handbook: This explains how to build or buy ($155) a little electrical gadget that can help clean the blood of any virus, microbe, parasite, fungus or yeast. The process was discovered by scientists at the Albert Einstein College of Medicine, quickly patented, and hushed up. It's curing AIDS, hepatitis C, and a bunch of other serious illnesses. The circuit can be built for under $20 from the instructions in the book. $10 (01)

The Secret Guide to Wisdom: This is a review of around a hundred books that will help you change your life. No, I don't sell these books. They're on a wide range of subjects and will help to make you a very interesting person. Wait'll you see some of the gems you've missed reading. $5 (02)

The Secret Guide to Wealth: Just as with health, you'll find that you have been brainwashed by "the system" into a pattern of life that will keep you from ever making much money and having the freedom to travel and do what you want. I explain how anyone can get a dream job with no college, no résumé, and even without any experience. I explain how you can get someone to happily pay you to learn what you need to know to start your own business. $5 (03)

The Secret Guide to Health: Yes, there really is a secret to regaining your health and adding 30 to 60 years of healthy living to your life. The answer is simple, but it means making some difficult lifestyle changes. Will you be skiing the slopes of Aspen with me when you're 90 or doddering around a nursing home? Or pushing up daisies? No, I'm not selling any health products. $5 (04)

My WWII Submarine Adventures: Yes, I spent from 1943-1945 on a submarine, right in the middle of the war with Japan. We almost got sunk several times, and twice I was in the right place at the right time to save the boat. What's it really like to be depth charged? And what's the daily life aboard a submarine like? How about the Amelia Earhart inside story?If you're near Mobile, please visit the Drum. $5 (10)

Travel Diaries: You can travel amazingly inexpensively – once you know the ropes. Enjoy Sherry and my budget visits to Europe, Russia, and a bunch of other interesting places. How about a first class flight to Munich, a rented Audi, driving to visit Vienna, Krakow in Poland (and the famous salt mines), Prague, back to Munich, and the first class flight home for two, all for under $1,000. Yes, when you know how you can travel inexpensively, and still stay in first class hotels. $5 (11)

Wayne's Caribbean Adventures: More budget travel stories – where I visit the hams and scuba dive most of the islands of the Caribbean. Like the special Liat fare which allowed us to visit 11 countries in 21 days, with me diving all but one of the islands, Guadeloupe, where the hams kept me too busy with parties. $5 (12)

Cold Fusion Overview: This is both a brief history of cold fusion, which I predict will be one of the largest industries in the world in the 21st century, plus a simple explanation of how and why it works. This new field is going to generate a whole new bunch of billionaires, just as the personal computer industry did. $5 (20)

Cold Fusion Journal: They laughed when I predicted the PC industry growth in 1975. PCs are now the third largest industry in the world. The cold fusion ground floor is still wide open, but then that might mean giving up watching ball games. Sample: $10 (22).

Julian Schwinger: A Nobel laureate's talk about cold fusion— confirming its validity. $2 (24)

Improving State Government: Here are 24 ways that state governments can cut expenses enormously, while providing far better service. I explain how any government bureau or department can be gotten to cut its expenses by at least 50% in three years and do it cooperatively and enthusiastically. I explain how, by applying a new technology, the state can make it possible to provide all needed services without having to levy *any* taxes at all! Read the book, run for your legislature, and let's get busy making this country work like its founders wanted it to. Don't leave this for "someone else" to do. $5 (30)

Mankind's Extinction Predictions: If any one of the experts who have written books predicting a soon-to-come catastrophe which will virtually wipe us all out is right, we're in trouble. In this book I explain about the various disaster scenarios, from Nostradamus, who says the poles will soon shift, wiping out 97% of mankind, to Sai Baba, who has recently warned his followers to get out of Japan and Australia before December 6th this year. The worst part of these predictions is the accuracy record of some of the experts. Will it be a pole shift, a new ice age, a massive solar flare, a comet or asteroid, a bioterrorist attack, or even Y2K? I'm getting ready, how about you? $5 (31)

Moondoggle: After reading René's book, *NASA Mooned America*, I read everything I could find on our Moon landings. I watched the videos, looked carefully at the photos, read the astronauts' biographies, and talked with some of my readers who worked for NASA. This book cites 25 good reasons I believe the whole Apollo program had to have been faked. $5 (30)

Classical Music Guide: A list of 100 CDs which will provide you with an outstanding collection of the finest classical music ever written. This is what you need to help you reduce stress. Classical music also raises youngsters' IQs, helps plants grow faster, and will make you healthier. Just wait'll you hear some of Gotschalk's fabulous music! $5 (33)

The Radar Coverup: Is police radar dangerous? Ross Adey K6UI, a world authority, confirms the dangers of radio and magnetic fields. $3 (34)

Three Gatto Talks: A prize-winning teacher explains what's wrong with American schools and why our kids are not being educated. Why are Swedish youngsters, who start school at 7 years of age, leaving our kids in the dust? Our kids are intentionally being dumbed down by our school system — the least effective and most expensive in the world. $5 (35)

Aspartame: a.k.a. NutraSweet, the stuff in diet drinks, etc., can cause all kinds of serious health problems. Multiple sclerosis, for one. Read all about it, three pamphlets for a buck. (38)

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Wayne Talks Not at Dayton: This is a 90-minute tape of the talk I'd have given at the Dayton, if invited. $5 (50)

Wayne Talks at Tampa: This is the talk I gave at the Tampa Global Sciences conference. I cover cold fusion, amateur radio, health, books you should read, and so on. $5 (51)

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Reprints of My Editorials from *73*.

Grist I: 50 of my best non-ham-oriented editorials from before 1997. $5 (71)

Grist II: 50 more choice non-ham editorials from before 1997.$5 (72)

1997 Editorials: 148 pages. 216 editorials discussing health, ideas for new businesses, exciting new books I've discovered, ways to cure our country's more serious problems, flight 800, the Oklahoma City bombing, more Moon madness, and so on. $10 (74)

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The *73* Flea Market, Barter 'n' Buy, costs you peanuts (almost)—comes to 35 cents a word for individual (noncommercial!) ads and $1.00 a word for commercial ads. Don't plan on telling a long story. Use abbreviations, cram it in. But be honest. There are plenty of hams who love to fix things, so if it doesn't work, say so.

Make your list, count the words, including your call, address and phone number. Include a check or your credit card number and expiration. If you're placing a commercial ad, include an additional phone number, separate from your ad.

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Send your ads and payment to: *73 Magazine*, Barter 'n' Buy, 70 Hancock Rd., Peterborough NH 03458 and get set for the phone calls. The deadline for the March 2000 classified ad section is January 10, 2000.

President Clinton probably doesn't have a copy of *Tormet's Electronics Bench Reference* but you should. Check it out at **[www.ohio.net/~rtormet/index.htm]**—over 100 pages of circuits, tables, RF design information, sources, etc. BNB530

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NEVER SAY DIE

continued from page 62

and was able to put his pain pills aside.

I've seen ads for the pads, but being a skinflint, and not sure what the benefits might be for me, I haven't invested in one. I don't have any pains and I have no problem in going to sleep when I lie down, day or night. And I worry about magnets, since one pole can increase blood flow and the other restrict it. Do I want to take a chance on messing up something that's working okay now? 73

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